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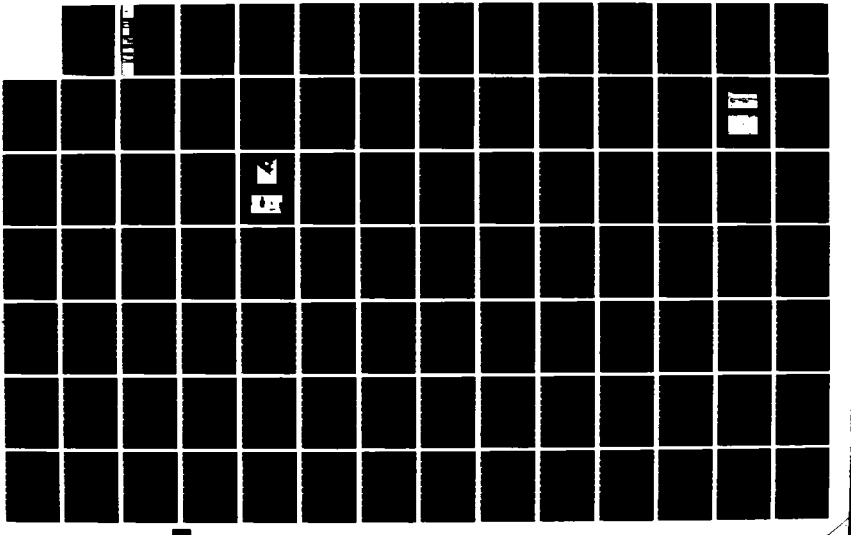

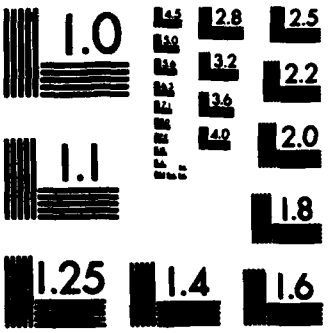

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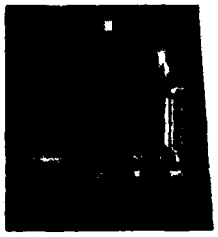


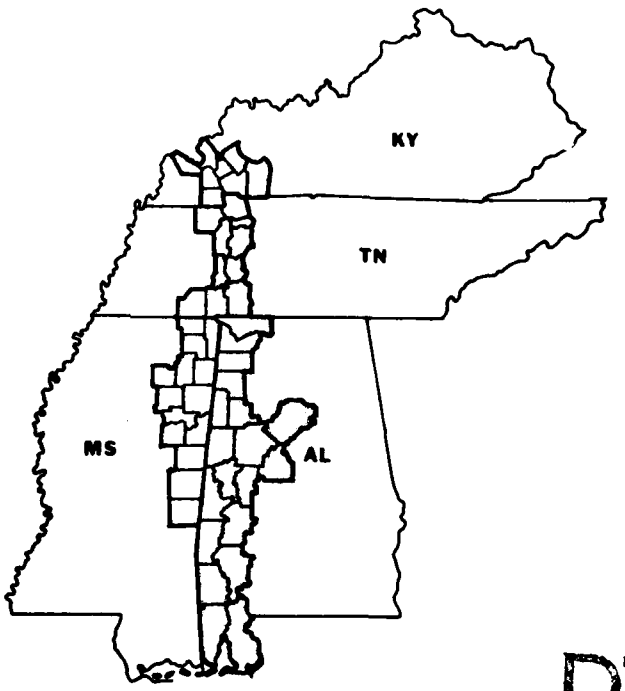
TENNESSEE-TOMBIGBEE CORRIDOR STUDY

MISCELLANEOUS PAPER EL-84-5

HANDBOOK FOR THE INSTITUTIONAL AND FINANCIAL IMPLEMENTATION OF WATER UTILITIES

by

M. John Cullinane, Jr., Janet S. Condra



May 1984
Final Report

Prepared for U. S. Army Engineer District, Nashville
Nashville, Tenn. 37202

and U. S. Army Engineer District, Mobile
Mobile, Ala. 36628

By *Environmental Laboratory*
U. S. Army Engineer Waterways Experiment Station
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Miscellaneous Paper EL-84-5	2. GOVT ACCESSION NO. AD-A143922	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) HANDBOOK FOR THE INSTITUTIONAL AND FINANCIAL IMPLEMENTATION OF WATER UTILITIES		5. TYPE OF REPORT & PERIOD COVERED Final report 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) M. John Cullinane, Jr., Janet S. Condra		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineer Waterways Experiment Station Environmental Laboratory P. O. Box 631, Vicksburg, Miss. 39180		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Tennessee-Tombigbee Corridor Study
11. CONTROLLING OFFICE NAME AND ADDRESS U. S. Army Engineer District, Nashville Nashville, Tenn. 37202 and U. S. Army Engineer District, Mobile, Mobile, Ala. 36628		12. REPORT DATE May 1984 13. NUMBER OF PAGES 265
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Available from National Technical Information Service, 5285 Port Royal Road, Springfield, Va. 22161.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Water-supply--Finance (LC)
Public utilities (LC)
Municipal water supply (LC)
Finance, Public (LC)
Water--Laws and legislation (LC)
Water supply engineering (LC)

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Implementation of a water utility project is a capital-intensive enterprise. Relatively large sums of money are required to construct treatment, transmission, and distribution systems. Traditionally, these financial requirements have been satisfied through a combination of private financing via the issuance of long-term fixed interest rate bonds and Federal and state financial assistance provided via grants and low or no interest loans. However, with recent high interest rates, investor disenchantment, and increasing

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20. ABSTRACT (Continued).

competition for capital, it has become difficult to issue conventional long-term fixed interest rate bonds traditionally used for public utility financing. As a result, "innovative and creative" financing and institutional arrangements are being attempted.

Financing and institutional arrangements generally available for the implementation of water utility projects are reviewed in detail herein. The legally available arrangements in the States of Alabama, Kentucky, Mississippi, and Tennessee are reviewed. Innovative and creative techniques are discussed and their relationship to current state laws are presented. Particular emphasis is placed on the review of legal constraints to the use of non-traditional financing techniques in the four states.

Sources of technical and financial assistance available to a water utility are inventoried and discussed in detail. Regulatory interfaces in each state are also addressed.

A brief review of the engineering nature of water utilities is presented along with simplified techniques for estimating the cost of various types of water utility projects. References are provided for detailed techniques for water utility analysis.

Many constraints to the use of innovative and creative financing and institutional arrangements are identified. Recommendations are made as to necessary actions to remove these identified constraints.

PREFACE

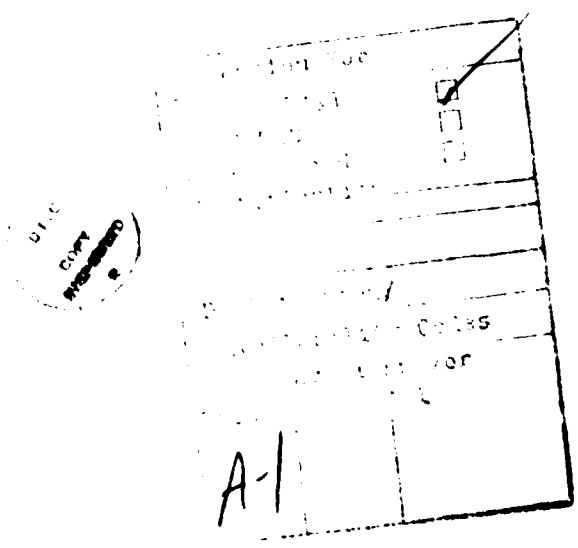
This report was prepared as part of the Tennessee-Tombigbee Corridor Study being conducted by the Nashville and Mobile Districts of the U. S. Army Corps of Engineers. Preparation of this report was sponsored by the Nashville District under Intra-Army Order 83-0046.

The work was performed during the period from June to December 1983 by the Water Supply and Waste Treatment Group (WSWTG), Environmental Engineering Division (EED), Environmental Laboratory (EL), U. S. Army Engineer Waterways Experiment Station (WES). The principal investigator on the study was Mr. M. John Cullinane, Jr. This report was written by Mr. Cullinane and Ms. Janet S. Condra. The work was conducted under the direct supervision of Mr. Norman R. Francingues, Chief, WSWTG; and under the general supervision of Mr. Andrew J. Green, Chief, EED, and Dr. John Harrison, Chief, EL. Assistance in planning, preparation, and performance of this study was provided by the Nashville District. Manager of the study for the Nashville District was Mr. Doug Radley.

Commander of the Nashville District during the study was COL William T. Kirkpatrick, CE; Commander of the Mobile District was COL Patrick J. Kelly, CE. Commander and Director of WES during the study was COL Tilford C. Creel, CE. Technical Director of WES was Mr. F. R. Brown.

This report should be cited as follows:

Cullinane, M. J., Jr., and Condra, J. S. 1984. "Handbook for the Institutional and Financial Implementation of Water Utilities," Miscellaneous Paper EL-84-5, U. S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.



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CONVERSION FACTORS, U.S. CUSTOMARY TO METRIC (SI) UNITS OF MEASUREMENT

U.S. customary units of measurement used in this report can be converted to metric (SI) units as follows:

Multiply	By	To Obtain
acre-feet	1233.489	cubic metres
feet	0.3048	metres
feet per second	0.3048	metres per second
gallons per minute	3.785412	cubic decimetres per minute
gallons per day	3.785412	cubic decimetres per day
gallons (U.S. liquid)	3.785412	cubic decimetres
inches	25.4	millimetres
miles (U.S. statute)	1.609347	kilometres
pints (U.S. liquid)	0.4731765	cubic decimetres
pounds (force) per square inch	6894.757	pascals
square feet	0.09290304	square metres

HANDBOOK FOR THE INSTITUTIONAL AND FINANCIAL IMPLEMENTATION OF WATER UTILITIES

PART I: INTRODUCTION

Background

The study

The Tennessee-Tombigbee Waterway, when placed into operation, will provide a link connecting the Ohio and Tennessee Rivers to the Port of Mobile on the Gulf of Mexico. This waterway improvement is expected to generate economic development along its entire route and beyond to include 51 counties designated as the Tennessee-Tombigbee Corridor. The area under study includes counties in Alabama, Kentucky, Mississippi, and Tennessee. Figure 1 illustrates the geographic extent of the study area (U.S. Army Corps of Engineers 1983).

It is envisioned that the waterway will stimulate substantial new employment, population growth, and private investment. If these changes are to occur in an orderly manner, early consideration must be given to water resources needs, environmental enhancement, and economic and human resources development. Water supply, a principal subcategory of water resources development, is the major topic of this report.

The analysis of water supply development requirements in the study area has been divided into two phases. Phase I concentrated on the engineering aspects of water supply with particular emphasis on the projection of water needs to the year 2000. It examined the quantity and quality of water available and the quantities being used, consumed, conserved, and discharged; and in what ways, by whom, and where in each of the 51 counties in the study area. A separate report was published for each county. In addition, a summary report comparing the water supply needs of each county was prepared so that those areas with the greatest needs could be identified (U.S. Army Corps of Engineers 1981).

As a result of the Phase I investigations, five general types of water supply problems were identified:

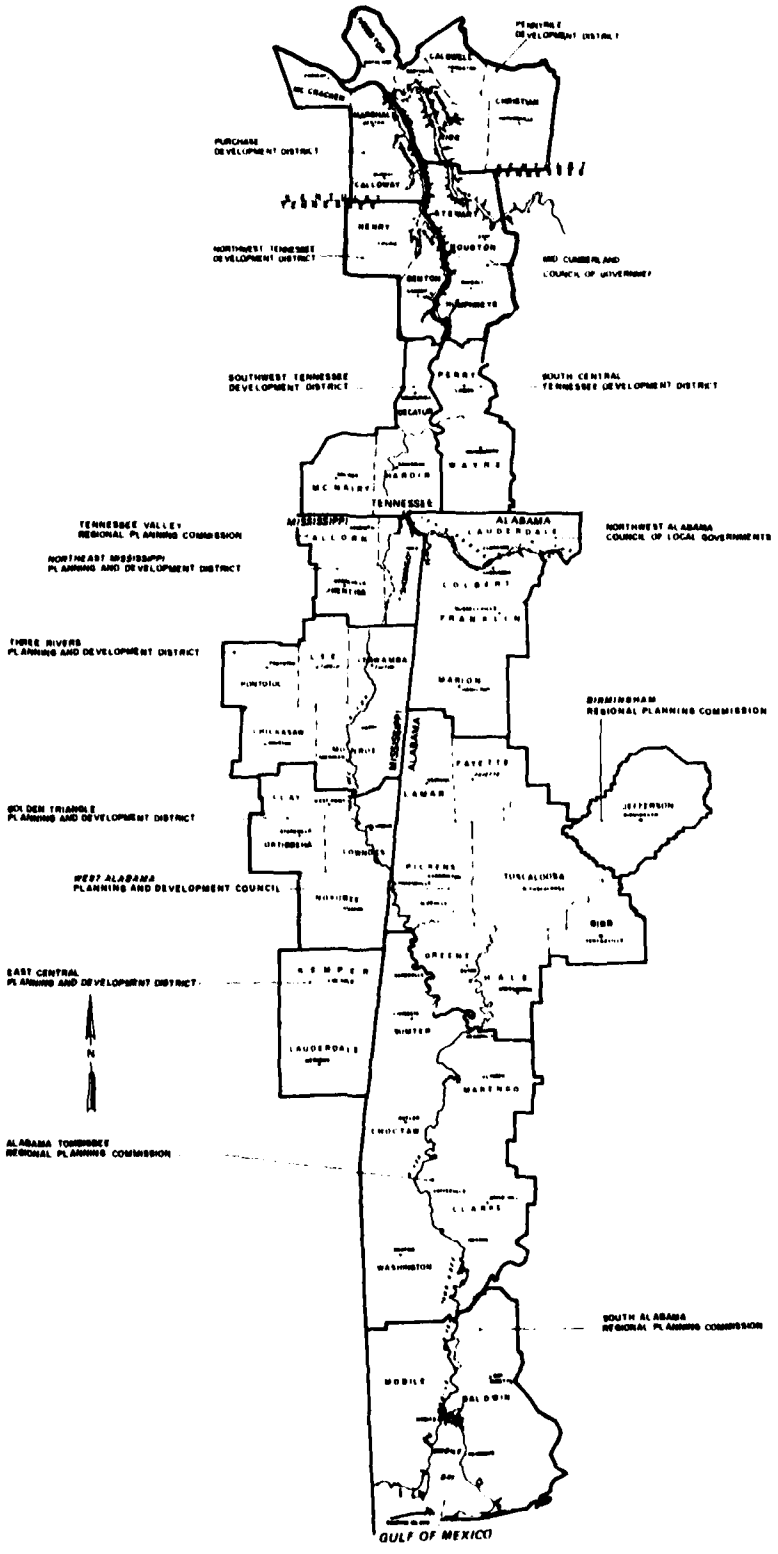

Figure 1. Geographic extent of the study area

a. Water systems with mechanical inadequacies resulting in unsatisfactory treatment of water.

b. Water systems operating at or near design hydraulic capacity.

c. Water systems without sufficient storage to meet average daily use.

d. Water systems relying on groundwater supplies threatened by declining water tables.

e. Water systems relying on surface water supplies threatened during low flow conditions.

In response to these identified problem areas, three general alternatives were identified as potential solutions in each county where problems were defined. These general solutions included the following:

a. Location and development of a new water supply source.

b. Consolidation of two or more water systems by interconnecting sources of supply and/or treatment.

c. Expansion of existing water systems to serve areas not presently served.

Phase I of the study focused on the identification of problem areas that are typically addressed through the formulation and implementation of construction programs. It was recognized, however, that development of alternative solutions must be addressed on a location-specific basis and that in many cases implementation of necessary institutional and financial strategies that accompany a particular engineered solution is more difficult than the actual engineering solution itself. Therefore, whereas Phase I focused on engineering problem identification, Phase II, culminating in this report, focuses on the institutional and financial strategies that can be used at the local level to ensure that selected alternative solutions can be implemented within required time frames.

Water utility projects

The discussion of water utility project implementation should begin with the definition of a water utility project. Unfortunately, the nature of a specific project defies simple definition. A water utility project may range in size and complexity from the simple extension of a water main or construction of an elevated storage tank to the planning of a water supply system for a large urban area that incorporates groundwater and surface water sources integrated into a complex treatment and distribution grid. A project may range from formation of a small independent water utility serving several

hundred people to the formation of a large regional water utility serving several hundred thousand people.

The size, complexity, and nature of the specific project determines the level of detail required in considering the institutional and financial implementation of a project. For example, a large water utility may finance construction of a 1-million-gal* elevated storage tank with operating revenue whereas for a small rural water utility the construction of a 50,000-gal elevated tank** would represent a significant financial burden requiring Federal or state financial assistance.

Professional services

The successful implementation of a water utility project demands the utilization of professional services from a team of experts that may include: the engineer, the general counsel, the bond counsel, and in some cases the financial advisor. The mix of these services and indeed even the need for a particular service will depend on the size and scope of a particular project. For example, the extension of a water main within an existing service area and financed with operating revenues may only require the engineer, whereas the implementation of a new water utility may require all four types of expertise.

Engineer. In cases where construction involves more than routine maintenance, i.e. system improvements, extensions, etc., the engineer is required to develop conceptual plans as well as detailed plans and specifications for project construction (Tinsley 1975). The use of a professional engineer registered in the state where the project is located for this function is generally required by the various state regulatory authorities. Depending on the utility and/or the proposed project, the engineering expertise may be provided by inhouse resources or through contractural arrangements with a consulting engineer.

In addition to the traditional engineering functions (feasibility studies, preliminary reports, plans and specifications, construction supervision), the engineer serves a vital role in those cases where bonds must be sold to finance construction. For small projects being financed by bonds where the bond issuer is a going concern, the stature and reputation of the engineer may

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* A table of factors for converting U. S. customary units of measurements to metric (SI) is presented on page 7.

** A Glossary of terms is provided in Appendix G.

be overlooked by the bond market. However, where the financing involves a new utility or is a major project to be supported by revenue bonds, the reputation of the engineer and the adequacy of the engineering feasibility report can become major factors in the marketability of bonds.

General counsel. A water utility will normally have an attorney that serves as the utility's general counsel. This attorney may be a staff attorney in the case of a large private water utility, an attorney assigned from a municipality's legal section in the case of a large municipal utility, or an attorney in private practice retained by a smaller public or private water utility. The general counsel is primarily concerned with everyday operational matters such as the formation of the utility, interpreting administrative regulations, negotiating with regulatory agencies, drawing up or reviewing contracts, and providing legal advice or assistance to management.

Bond counsel. As the fields of law have become increasingly complex, the natural tendency of the legal profession has been towards specialization. One such speciality is in the area of bond law. Law firms become recognized in the field of bond law only after years of practice. The primary duty of the bond counsel is to render an unqualified approving opinion as to the legality of the bond issue, without which the bonds would not be marketable at any price.

Bond counsel are not usually available inhouse and must be retained from outside sources. The primary selection factor is that the firm is recognized and that its opinion is accepted within the geographical area within which the retail distribution of the bonds is expected (Tinsley 1975). If the prospective issue is relatively small and is not expected to attract bids from out-of-state, then the retention as bond counsel of a firm whose opinion is regularly accepted within the state is satisfactory, but if the issue is large and bids are expected from a large geographic area, then the bonds should carry the approving opinion of a nationally recognized firm.

For small utilities, the majority of which are financed using Farmers Home Administration (FmHA) loans, bond counsel must be on the FmHA-approved list. Each state office of the FmHA maintains an approved bond counsel list. The FmHA state office can be contacted to obtain copies of the approved bond counsel list (see Part III of this report).

Financial advisor. While the bond counsel is concerned with all legal proceedings in connection with the authorization and issuance of bonds, the

financial advisor is concerned with the financial aspects and matters of marketing judgment (Tinsley 1975).

Since most water utilities are financed with revenue bonds, the debt structure of the utility is often complicated with numerous conditions that are the covenants of previous bond issues. The financial arrangements must be designed to accommodate conditions peculiar to the local debt situation. The bond issue should be designed to impose the minimum hindrance on the financial freedom of the issuer while affording the maximum security to the investor. It is the responsibility of the financial advisor to provide such a design and the responsibility of the bond counsel to incorporate the design into the contract which is the bond indenture (Tinsley 1975).

Purpose of the Study

The primary purpose of this study and report is to provide local planners and decisionmakers within the study area with general guidance on the institutional and financial strategies available for implementating a water utility project. A secondary purpose is the compilation of a definitive list of organizations within the study area that either regulate and/or provide technical and financial assistance to water utilities.

Scope of the Study

The Phase II water supply study is oriented towards the development of non-site-specific institutional and financial strategies that are available for implementation of a water utility service. The discussion of the traditional engineering and planning aspects of water utility development is limited to those minimum concepts that are necessary to understand the various institutional and financial issues that may develop during the course of project formulation and implementation.

The Phase II study and report is not intended to replace the professional services generally performed by engineers, attorneys, or financial advisors. The exact requirement for these types of services must be evaluated on a project-specific basis. If a project is deemed of sufficient magnitude to require one or more of these types of services, then the professionals performing them must either be retained from outside sources or dedicated to the

project from inhouse personnel. The level of professional services required by any one project is much greater than can be detailed in a general report such as this one. It is therefore highly recommended that professional services be retained as necessary during the initial formulation stages of any specific project.

Organization and Use of the Report

Organization

The remainder of this report is organized into the four major parts described below:

a. Part II. "Engineering Aspects of a Water Utility" briefly describes the various components of a water system and the engineering concerns associated with water utility development. General information is also provided on the costs and example financial feasibility analyses associated with water utility project implementation.

b. Part III. "Institutional Implementation" describes the organizational concepts available for water utility implementation and discusses the various organizational interfaces that may occur during the implementation process. The constitutional and legislative authority for water utility implementation available in each state in the study area is discussed. The regulating authorities in each state, their procedures, and their functions are described. In addition, sources of technical assistance in each state are identified.

c. Part IV. "Financial Implementation" discusses the traditional financing methods used to implement a water utility project. The primary emphasis is on the means of financing capital improvements. Sources of state and Federal financial aid within each state in the study area are also inventoried and discussed.

d. Part V. "Innovative and Creative Implementation Techniques" describes new techniques that are being used to implement water utility projects. Although creative institutional arrangements are discussed, the emphasis is placed on innovative and creative financing techniques for capital improvements. The constitutional and statutory basis for each type of innovative financing technique is discussed. Where innovative institutional and/or financial techniques are prohibited by state statute, necessary legislative changes are identified.

Use

This report is designed as a basic primer in the institutional and financial implementation of a water utility project. It has been developed primarily for the use of laymen that may have an interest in the initial development or improvement of a water utility. The report has been compiled into four basic sections that generally follow the flow of information development

during the course of implementing a water utility project. The use of this report assumes that the problem to be corrected or alleviated by the proposed water utility project has been previously identified. Once this step has been reached, the layman can use this report as a source of basic information on the process required to implement a water utility project.

Following general definition of the problem, the first step in implementation is usually the development of a plan for problem solution through development of an engineered alternative. Therefore, the user of this report will want to review Part II for a brief review of the engineering aspects of water supply. From Part II, the report user will be able to develop a general concept of possible alternative solutions. Of particular interest is the discussion of the need for water demand projections and the description of the various components of a water supply system.

Once a general understanding of the engineering aspects of water supply has been developed, Part II of the report leads the user into a discussion of costs and financial feasibility. The report user will thus be able to develop order of magnitude cost estimates and use the hypothetical examples to develop an understanding of the meaning of financial feasibility of a project.

Part III of the report is designed to lead the user to an understanding of the institutional problems associated with implementing water utility projects. After reading Part III, the laymen should have sufficient knowledge of the institutional relationships to enable him to participate effectively in the project development process. Of particular importance to the report user is the inventory of regulatory and technical assistance agencies that can be called upon to obtain additional information related to particular requirements of a specific water utility project.

Parallel with the development of the institutional framework for water utility project implementation, the report user can review Part IV to develop an understanding of the basics of traditional methods of project financing. The user should find the inventory of potential sources of financial assistance particularly useful.

The understanding of the traditional institutional and financial implementation processes, developed by the user after review of Parts III and IV, serves as a foundation for the materials on innovative and creative institutional and financial arrangements presented in Part V. Although those techniques presented in Parts III and IV will probably have the greatest

applicability to the majority of water utility projects proposed for implementation in the study area, Part V presents the report user with information on state-of-the-art techniques currently being proposed and/or used for implementation of water utility projects. The pros and cons of each technique are presented. Although no value judgments are made for the user, sufficient information is presented to enable the user to apply the concepts to specific water utility projects.

The main body of the report is supplemented by a number of appendices presenting a variety of detailed information related to water utility projects. Appendix A provides Farmers Home Administration planning guidelines. Appendix B provides the user with an overview of a financial feasibility study. Appendices C through F provide the user with a detailed review of constraints associated with the use of innovative/creative financing techniques within each state in the study area. Appendix G provides the user with a useful glossary of terms that are often used in water utility project implementation.

This report is not designed to enable the user to singlehandedly implement a water utility project. The actual implementation of the project is the function of a number of professional specialities including engineering, legal, and financial skills. This report, however, is designed to enable the lay person to understand the steps in the implementation process and, through such understanding, the lay person can ensure that selected problem solutions meet the needs and desires of the community.

PART II: ENGINEERING ASPECTS OF A WATER UTILITY

Requirement for Water

Public health, welfare, and economic development are dependent on the reliable supply of potable water. From a public health standpoint, water is necessary for drinking and sanitation. While public drinking water use averages approximately 5 pints a day, other public uses such as cooking, washing, bathing, sanitation, and lawn sprinkling bring the total average demand to a range of 50 to 90 gal per capita per day. In terms of public welfare, water is essential for fire protection and recreation uses (e.g. swimming pools). It is generally agreed that economic development cannot take place without the assurance of an adequate water supply to meet the needs of industrial and commercial interests.

Water utility systems classify water use into several categories including domestic, commercial, industrial, public, and unaccounted for water. Domestic water includes that water furnished to homes, hotels, apartments, etc., for sanitary, drinking, washing, and other purposes. This use may range from 20 to 100 gal per capita per day. Water furnished to industrial and commercial plants is classified as industrial and commercial. The quantity of this use has been related to floor area of the buildings served with an average of 0.3 gal/sq ft/day. The actual usage in this category, however, is highly variable and specific to a particular commercial or industrial enterprise. Public use for public buildings such as city halls, jails, and schools requires 14 to 20 gal per capita per day. Unaccounted-for water represents that portion of the supplied water that is lost or wasted due to leaks, unmetered public use, meter inaccuracies, and unauthorized water connections. A system that is metered and moderately well maintained may expect a 10-percent loss of water. Table 1 gives the projected uses of water for the year 2000 for each category (Steel and McGhee 1979). These numbers represent average use values and the reader must be aware that water demand may increase two to four times the average during peak usage periods. The values presented in this text and in Table 1 are dependent on a number of important factors including city size, presence of industries, water quality, water cost, and population characteristics. They can be used as a guide, however, in estimating average total water demand for water supply utility.

Table 1

Projected Water Use By Category for the Year 2000*

Use	Gallons Per Capita Per Day	% of Total
Domestic	80	45
Industrial	42	24
Commercial	26	15
Public	16	9
Unaccounted for	13	7
Total	177	100

* Steel and McGhee (1979).

For rural systems financed by FmHA, the general design procedure is to provide 35 gal per capita per day, or 140 gal per family per day, or 4200 gal per meter per month (U. S. Department of Agriculture 1977). These relatively low planning figures reflect the primarily domestic nature and absence of fire protection considerations of the rural systems financed by FmHA. Note that larger users in these systems must be identified separately.

Water requirements also include fire flow demands if fire protection is provided for in system design. To determine fire flow requirements, the Insurance Services Office (Carl, Young, and Anderson 1973) uses the formula

$$F = 18\ C\ (A)^{0.5} \tag{1}$$

where

F = required fire flow, gpm

C = coefficient related to type of construction

A = total floor area (excluding basements), sq ft

The type of construction coefficient C ranges from a minimum of 0.6 for fire resistive construction to a maximum of 1.5 for wood frame construction. Fire flow must be deliverable for a minimum of 4 hr but as long as 10 hr may be required by some communities (Clark, Viessman, and Hammer 1977).

System Components

Water utilities, both publicly and privately owned, are created to construct, operate, and maintain water supply systems. The basic function of these water utilities is to obtain water from a source, treat the water to a suitable quality, and deliver the water to the user at the time and in the quantity desired. As a result of this basic function, the analysis of water utility systems is often devoted to the evaluation of one or more of five system components: source, raw water transmission, treatment system, storage system, and distribution system.

Source

The initial location of the water to be collected and distributed to the user by the water utility is the source. Source development refers to those improvements to the natural conditions that are necessary to ensure a sufficient quantity and quality of water to meet system requirements. Such improvements may include construction of a reservoir to ensure an adequate surface water supply or construction of a well to develop a groundwater source.

Traditionally, three sources of supply are considered when initially implementing or expanding a water utility. These include development of a surface water source, development of a groundwater source, or purchasing finished water from an adjacent utility. The development of the surface water or groundwater source is either accomplished by the water supply utility or by another agency with the water supply utility agreeing to purchase raw water from the development agency. Usually, only a single source classification is used, i.e. either groundwater or surface water. Recently, the increasing demands placed on the water resources of this country have encouraged the investigation of alternative strategies for ensuring an adequate supply of water. Prominent among these new strategies are conjunctive use, demand management, and water reuse.

In many cases, it is evident that the choice of a water source can no longer be limited to one category. It is necessary to evaluate alternatives using all combinations of possible sources. For example, a particular water utility may find it economically attractive to incorporate both surface water and groundwater sources in its overall development plan. In addition, these basic sources may be augmented by demand management practices and implementation of water reuse programs.

Surface water. Surface water sources, in the form of natural lakes and ponds and impounding reservoirs and rivers, supply over half the population of the United States. The quantity of surface water is largely dependent on rainfall while the quality of a surface water source depends upon the characteristics of the watershed, its geology and topography, the extent and nature of development by man, time of year, and weather conditions. The quality of water from rivers and streams is generally more variable and less satisfactory than that from ponds, lakes, and groundwater sources (American Water Works Association 1951). Surface sources located in heavily populated areas may be adversely affected by sewage and industrial wastes. A typical water supply reservoir is shown in Figure 2.

Groundwater. Part of the rain which falls on the ground surface percolates into the ground and becomes groundwater. Groundwater sources may be divided into three groups: springs, shallow wells and infiltration galleries, and deep wells. Groundwater quality is usually better than that of surface water. Groundwater sources require little treatment, have uniform temperatures throughout the year, and are generally cheaper to develop than surface water sources. They are not affected by drought conditions in the short run; however, the lowering of water levels in wells may result in their abandonment. In areas of falling water levels, groundwater recharge may be used to supplement the supply. Recharging involves the pumping of water such as poor quality surface water or treated wastewater over a land area and allowing this water to seep through the soil to infiltration galleries or an aquifer from which the water can later be removed. A typical well field supplying water to a municipal system is shown in Figure 3.

Conjunctive use. The incorporation of more than one type of water source, i.e., groundwater and surface water, to supply a water utility system is called conjunctive use and is a management technique aimed at optimizing water resource utilization. The conjunctive use concept has particular meaning in areas where one source is not sufficient to meet the needs of the utility system. The integrated use of both ground and surface sources, for instance, may solve this kind of problem. A study conducted by Pennsylvania State University (1982) concluded that the coordinated use of groundwater and surface water can be highly efficient if both sources are available in appreciable amounts. The mixing of groundwater and surface water of different qualities was found to be an economic advantage for conjunctive use.

Figure 2. Typical water supply reservoir

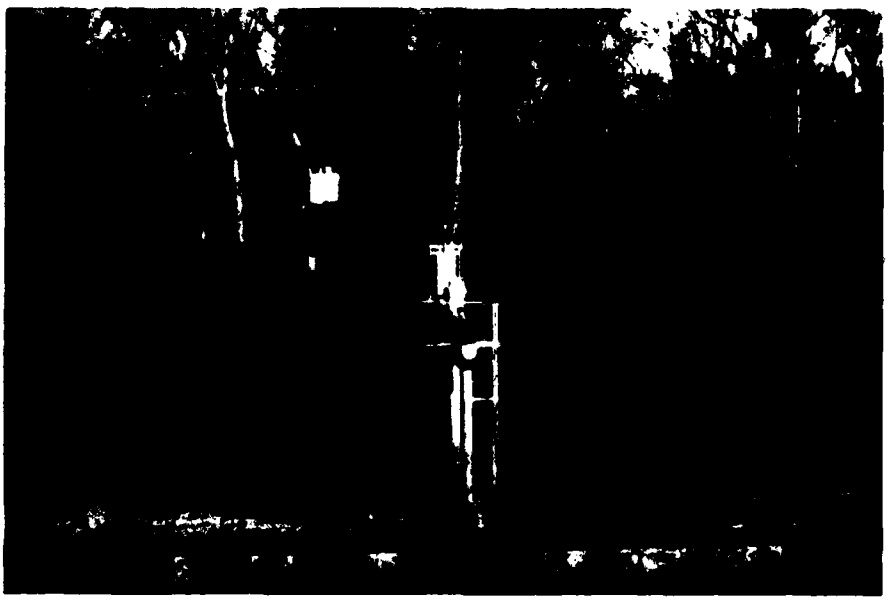

Figure 3. Typical well field

Demand management. The conservation of water, often called demand management, has received greater attention in recent years due to the threat of water supply shortages. These shortages may be a result of exhausted water resources, contaminated sources, or prohibitive treatment and source development costs. The implementation of various water conservation measures can aid in reducing the magnitude of source development projects. Although demand management has been practiced in areas of critical shortages (e.g., during droughts), the extent to which water use reductions can be sustained when and/or where water is plentiful is not fully known. Many flow reduction devices and low-flow fixtures and appliances are now available for commercial use. The American Water Works Association (1981) is actively promoting water conservation programs to improve the efficiency of water utility operations and reduce the percentage of unaccounted for water. An extensive list of possible water conservation practices is presented in Table 2 (Office, Chief of Engineers (OCE) 1983).

Water reuse. Water reuse is being explored and is currently used in some areas as a method of supplementing the existing water supply. Water reuse involves the reclamation of wastewaters for specific uses. By treating the wastewater to various degrees, reclaimed waters can be beneficially used for irrigating parks, golf courses, pastures, and certain crops; for recreational lakes; and for industrial cooling and boiler feed water. By utilizing water reuse technology, the more precious water supply sources (i.e. groundwater and surface water) can be protected for municipal water uses.

Raw water transmission

Water is carried from the source to a treatment plant or distribution system by a transmission main. This main must be capable of carrying the maximum flow required by the service area. In large cities this maximum rate is usually dictated by the maximum daily demands of the system, whereas in small cities the maximum rate may be dictated by the fire flow requirements. Water is most often transported under pressure using pumps either with or without storage facilities.

Treatment system

The removal of specific impurities in water supplies is necessary to produce a safe, potable water. There are certain microorganisms in water that cause disease; certain algae that cause disagreeable odors; certain salts in large amounts that cause unpleasant tastes, hardness, or corrosiveness; and

Table 2

Long-Term Water Conservation Practices*

General Application	Industrial Use
Public education	Recirculation of cooling water
Metering	Reuse of cooling and process water
Pricing	Reuse of treated wastewater
Uniform rate blocks	Efficient landscape irrigation
Increasing rate blocks	Low-water-using fixtures
Penalty charges	Process modifications
Demand charges	
Leak detection	
System rehabilitation	
Interior Residential Use	**Agricultural Irrigation**
Retrofit devices	Off-farm conveyance systems
Displacement bottles	Canal lining
Shower flow restrictors	Canal realignment
Toilet dams	Canal consolidation
Low-flow shower heads	Phreatophyte control
Pipe insulation	
Pressure regulators	On-farm distribution and irrigation systems
Faucet aerators	Ditch lining or piping
Water-efficient appliances	Water control structures
	Land leveling or contouring
Devices for new construction	Sprinkler irrigation
Low-flush toilets	Drip irrigation
Low-flow shower heads	Tailwater recovery
Pipe insulation	Irrigation scheduling
Pressure regulator	Improved tillage practices
Air-assisted showers	Surface mulches
Air-water toilet	
Faucet aerator	Return flow systems
Water-efficient appliances	Field drainage
Dual water systems	Main drainage
Energy Generation	**Urban Landscape Irrigation**
Recirculation of cooling water	Reduced watering
Reuse of treated wastewater	Low-water-use planting
In-system treatment	Sprinkler systems
	Scheduled irrigation
	Moisture-sensing controllers

* Office, Chief of Engineers (1983).

certain gases that cause odors and corrosiveness. Bacteriological, chemical, and physical quality requirements must be met by the treatment scheme. Water treatment processes required to produce an acceptable water depend on the raw water quality, source, and anticipated variations in quality for each source.

The U.S. Environmental Protection Agency (USEPA) has been charged with establishing Primary Drinking Water Standards under the Safe Drinking Water Act of 1974 (Public Law 93-523) for all public water systems. The existing standards set maximum contaminant levels (MCLs) for certain inorganic and organic chemicals known to have toxic effects, for turbidity, and for microbial population. The reader is referred to the appropriate state regulatory agency (Part III of this report) for an explanation of specific requirements.

Surface water. Surface water quality may be highly variable depending upon characteristics of the watershed. During spring runoff or periods of high flows, a river may be muddy and high in taste- and odor-producing compounds. During low-flow periods, pollutant concentrations may be high and odorous conditions can occur. River water supplies normally require the most extensive treatment system and must have the operational flexibility to handle anticipated day-to-day variations in water quality. The quality of lake or reservoir water depends on the size, depth, climate, watershed, and degree of eutrophication. Impounding a river generally results in better water quality through the reduction of turbidity, microorganism populations, and usually color, and the elimination of day-to-day variations in quality found in free flowing rivers. Treatment requirements usually associated with surface water supplies may include screening, presedimentation, chemical treatment, and disinfection. A typical surface water treatment scheme is illustrated in Figure 4. The specific chemicals selected for treatment depend upon their effectiveness to perform the desired reaction and their cost.

Groundwater. Groundwater supplies often contain excessive concentrations of iron, manganese, and hardness. Some well supplies may contain hydrogen sulfide or excessive concentrations of chlorides, sulfates, and carbonates. Hydrogen sulfide can be removed by aeration or other oxidation processes. Hardness can be removed by chemical treatment or ion exchange. In some cases, disinfection may be the only treatment required. A typical groundwater treatment scheme incorporating aeration, filtration, and chlorination is shown in Figure 5.

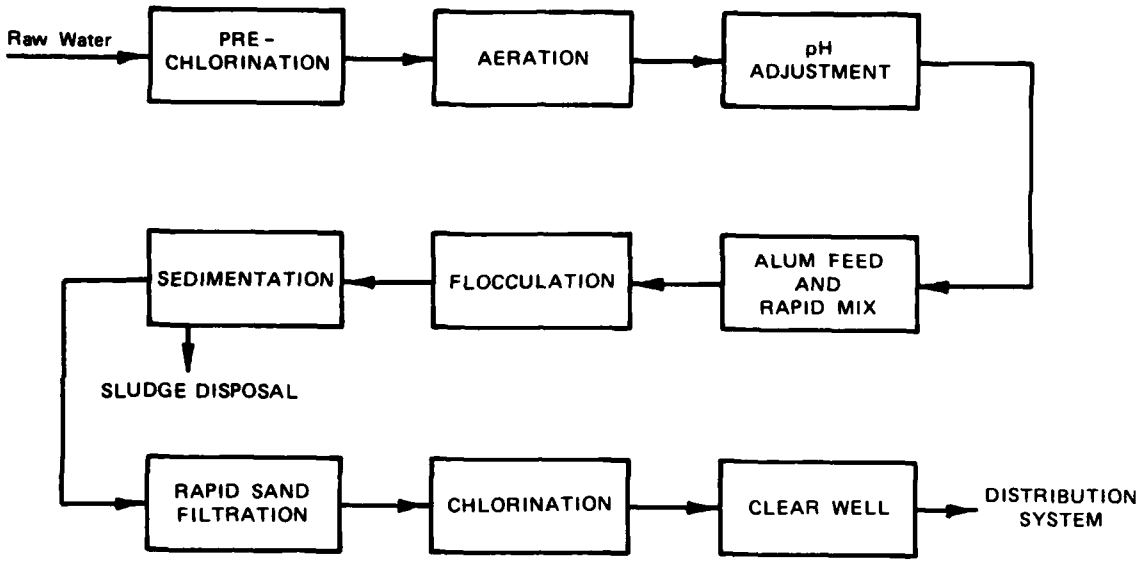

Figure 4. Typical surface water treatment scheme

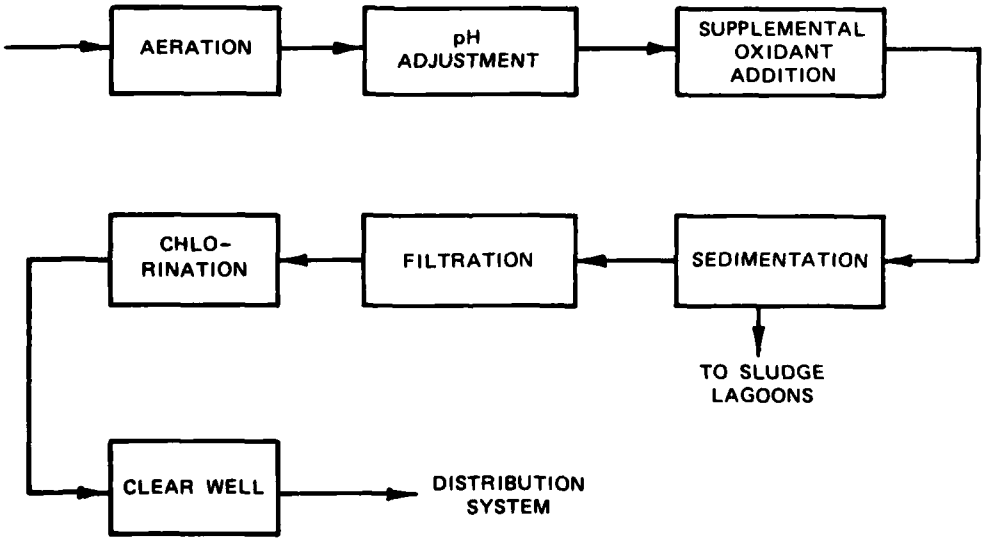

Figure 5. Typical groundwater treatment scheme

Storage system

Distribution storage facilities are used to equalize pumping rates over the day, keep the water pressure high at all times, furnish water for emergencies such as fire fighting or accidental breakdowns, and facilitate the use of economical pipe sizes. Storage is provided by underground, ground-level, elevated, or hydropneumatic (pressurized) tanks.

Distribution storage is best located on the opposite side of the high-consumption district from the pumping station. If the storage tank is located at the pumping plant, low pressures in outlying areas may result. The capacity of the storage tanks will depend on the load characteristics, type, and size of the water supply system. Distribution storage volume may vary from about one half the average daily use to a 2- or 3-day supply for small systems. In general, engineers recommend that a small utility store at least a 1- to 2-day supply.

Underground and ground-level tanks. Underground and ground-level tanks are usually used for intermediate storage following treatment, but prior to the distribution system. These facilities may be used for distribution by gravity flow when the topography provides a suitable location. Advantages of these tanks include lower capital and maintenance costs, easy observation of the general quality of the stored water, and safety.

Elevated tanks. Elevated tanks can supply water for distribution by gravity flow. The tanks operate by maintaining a preselected high-water level. When the water is below the preselected low-water level, water is pumped into the tank until the high-water level is reached, at which time pump operation ceases. Water is delivered by gravity until the preselected low-water level is reached and pumping begins again. Figure 6 illustrates a typical elevated storage tank.

Hydropneumatic tanks. Hydropneumatic tanks deliver water under pressure and are more commonly used in smaller water systems. Hydropneumatic tanks operate by pumping water to the tank in response to signals from a control system designed to maintain the tank pressure between preselected high and low limits corresponding to high-water and low-water levels. Air in the tank is compressed as the water enters and, thus, the water is stored and distributed under pressure. As the water flows from the tanks, the pressure reaches the preselected minimum value and the pump is then activated by the control system initiating the filling cycle again. In most cases, a hydropneumatic tank will

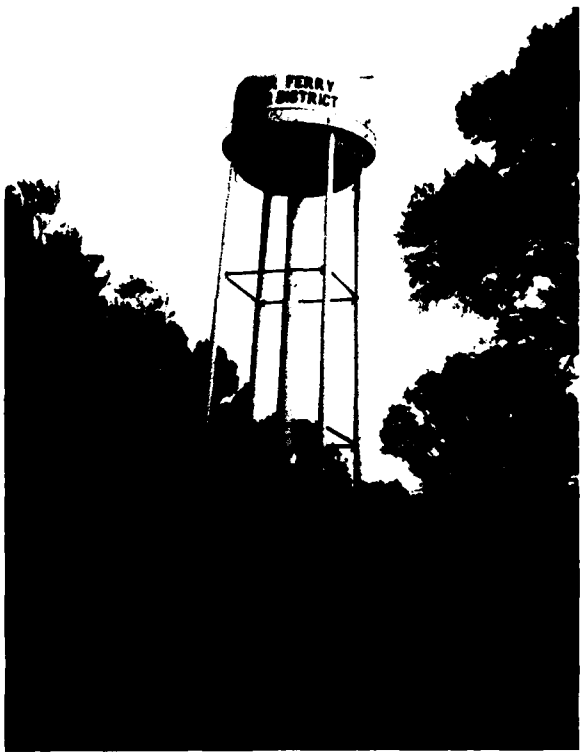

Figure 6. Typical elevated storage tank

not provide sufficient storage in the tank to adequately respond to high rates of demand; therefore, the pump alone must be sized to meet peak demand requirements. Figure 7 illustrates a typical hydropneumatic storage tank.

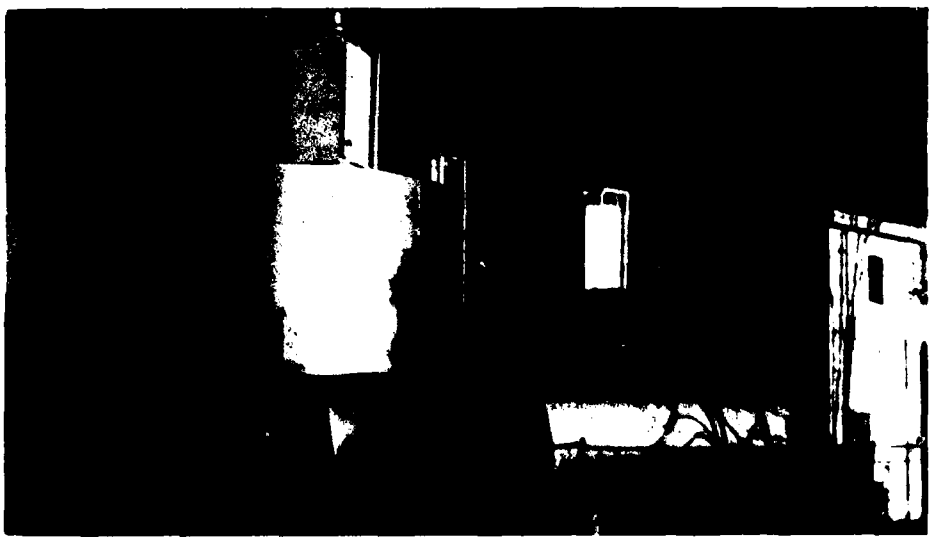

Figure 7. Typical hydropneumatic storage tank

Distribution system

Distribution systems serve to transport potable water to a water utility's customers and, where included, to furnish fire protection. The water must be distributed at a satisfactory pressure and quantity and, if fire protection is included, must supply fire flows to public and private hydrants. The American Water Works Association (AWWA) recommends a minimum of 40 pounds of pressure per square inch (psi) for street pipelines and 20 psi for household use. The reliability of distribution system design is important so that failure at one point will not disrupt service to other areas.

Distribution systems may be classified as branching systems or loop systems. The desired pattern is dictated by street patterns, degree and type of development in the service area, topography, and location of treatment and storage works. A branching system characterized by a main supply line with several branch lines is most often associated with rural areas. The loop system, used in urban area applications, is laid out in a grid pattern and is usually preferred to a branching system since it can furnish a supply to any point from at least two directions. The branching system does not permit this degree of safety and may have numerous dead ends. Pipe sizes are selected on assumed velocities of 3 to 5 fps. Where fire-fighting requirements are to be met, the National Board of Fire Underwriters (Clark, Viessman, and Hammer 1977) recommends 8-in.-diam pipe as a minimum but permits 6-in. pipes in loop systems providing the length between connections does not exceed 600 ft. Common pipe diameters in loop systems range from 6 to 16 in.

System Planning

Water utility implementation should begin with the development of a comprehensive water supply plan. These plans should include an inventory of the existing system, development of system or project alternatives, alternative evaluation, and, finally, a detailed description of the selected alternative. For small systems, the FmHA publishes guidelines for the contents of planning reports required for FmHA-financed water utility projects. These guidelines are included as Appendix A to this report.

System inventory

User characterization. Once the service area has been defined, the types

of users and their expected water demand are determined. User types may include domestic, commercial, industrial, and/or agricultural. Water use estimates are based on population projections, per capita water use estimates, residential lot sizes, existing and expected industrial and commercial uses, and fire-fighting requirements.

Source identification. Alternative water supply sources are identified, and each is evaluated on the basis of its potential as an adequate, safe, and economic supply of water. Some plans may only consider one source while others may have both groundwater and surface water alternatives. Some utility systems may consider purchasing water from another system as an alternative supply source. Programs for water reuse, conservation, or conjunctive use may also be considered.

Surface water source investigations must include the gathering of precipitation data and identification of watershed characteristics. A determination must be made of the ability of the surface source to meet projected water use demands. The base flow of a stream is affected by several factors, which include rainfall, the size of the drainage basin, topography of the basin, and the water-holding capacity of the soils. The water quality characteristics of the surface sources must be evaluated as a basis for treatment process selection. Particular attention must be given to seasonal low flows which impact the safe yield of the surface water source.

When considering groundwater sources, several factors must be investigated including the safe yield, geology of the area, groundwater quality, current groundwater use impacts, and assessment of the potential groundwater use. A knowledge of the geology of the area will aid in locating aquifer systems which have water supply potential and will also aid in determining groundwater quality. In many areas of the country, aquifer safe yields are being exceeded with a resulting long-term decline in the water table. Such factors should be considered when contemplating development of a groundwater source.

Storage facilities. The possibility of using storage facilities in the water system must be included in the water supply plan. Location, type, and size of each storage facility must be planned to meet the peak demands, pressure requirements, and fire protection needs of the water system.

Distribution system layout. The layout and design of the distribution system are important parts of the water supply plan. Depending on the

characteristics of the service area, the system may be planned as a loop or branching system. Pumping and storage must be considered simultaneously with the distribution system plans to ensure that all three components work together to satisfactorily deliver water to the users. Distribution system appurtenances, such as valves, fire hydrants, and water meters, and pipe size, location, and type should be shown on a master plan or map of the distribution system.

Alternative development

Once each of the components of the water utility system has been inventoried, system alternatives can be developed. Components are combined to make alternative system designs. A utility should consider two or more alternative systems for detailed evaluation and screening.

Alternative evaluation

Once the alternative designs have been selected, a detailed evaluation can be made as a basis for alternative selection. A system evaluation may be composed of several considerations but usually includes a hydraulic analysis, an evaluation of operation and maintenance requirements, and an estimation of system costs.

A hydraulic analysis of the proposed water supply system should be conducted to assess the performance of the various system components. The hydraulic analysis of a water distribution system usually involves the evaluation of the frictional head losses in the pipes and appurtenances for various design flow rates. This information can be combined with topographical data to estimate operating pressures at various locations within the system. Since it is essential that the distribution system be capable of delivering the maximum instantaneous design flow at a satisfactory pressure, a revision of the planned pipe sizes and locations may be necessary to produce a suitable design. Computer models, particularly for large systems, are often used to perform the necessary hydraulic design analyses.

An evaluation of the operation and maintenance requirements for the water supply system should be made during the planning stage. If this type of evaluation is completed before final plans are prepared, many pitfalls in system design can be avoided. The system operation should be evaluated under several conditions (e.g., average, peak, and minimum demand periods as well as various types of emergency situations). Provisions for dealing with problems (e.g.

pipe breaks, power outages, etc.) can be made if process and equipment reliability and types of failures that are likely to occur are considered during initial project design.

The analysis of project costs and associated financial feasibility is a major part of the alternative evaluation process. A detailed discussion of these two topics is included in succeeding sections of this report.

Alternative selection

The selected alternative will usually be the lowest cost alternative consistent with the short- and long-term environmental constraints associated with a specific project area. Project costs should be evaluated on a present worth or annualized cost basis and include a consideration of the annual operation and maintenance as well as the initial construction cost of the system. The lowest cost alternative may not be politically or institutionally feasible. In such cases, it may be necessary to select more costly alternatives in order to implement needed improvements.

A complicating factor in the alternative selection process is the assistance programs available from the state and Federal government agencies. In some cases, the availability of assistance programs for specific activities may create anomilies in which the lowest cost alternative may actually have a higher local cost than alternatives with a higher total cost. An example of such an assistance program is the USEPA Wastewater Treatment Construction Grants program. Since only construction is eligible for grant assistance, it is advantageous for local interest to invest heavily in capital expenditures in order to reduce later operating costs. The result is a program in which local interests may benefit from implementation of a higher cost alternative.

Project Costs

Selection of the least cost alternative is highly dependent on the accurate estimation of project costs. Estimates of these project costs are usually made by the engineer based on his knowledge of unit prices for work of a similar nature in the geographic area of the proposed project. These unit prices are applied to the principal items of work in the tentative project plan. For projects involving equipment, costs for the equipment can be obtained from manufacturers and vendors.

Cost categories

The costs associated with the development and implementation of a water utility system are generally divided into two broad categories: capital costs or operating and maintenance costs. Capital costs are those costs related to construction of new facilities and/or major system improvements or rehabilitation. Operating and maintenance costs, on the other hand, are those day-to-day costs associated with running the water utility system.

Capital costs, also called project costs, include direct construction costs, indirect construction costs, right-of-way and land costs, fiscal costs (primarily interest), and allowances for contingencies. Allowances must also be made for indirect construction costs including such items as engineering and attorney fees, client administration expenses, testing costs, and subsurface exploration costs. These indirect costs are also usually estimated based on the engineer's prior experience on similar projects.

Right-of-way and land costs are based on the prices of land and/or right-of-way prevailing in the general project area. During the financial feasibility analysis, specific parcels of required land are usually not appraised. The actual appraisal and land or right-of-way acquisition are accomplished in later phases of a project.

Fiscal costs consist of interest during construction and capitalized interest. Interest during construction represents the interest on any short-term borrowing that is used to initiate construction prior to issuance of any long-term debt. Interest during construction is usually calculated by applying the current rate of interest for short-term loans to the anticipated amount and time of use of construction funds. Capitalized interest is the amount of interest included in the long-term debt issue. Typically, capitalized interest is the amount of interest accumulated between the issuance of long-term debt and the completion of construction.

A contingency allowance is also included in the financial feasibility analysis. An allowance of between 10 and 15 percent (depending on the size and complexity of the project) is often allowed as a construction contingency. An additional 2 to 5 percent project contingency allowance is also often added. Total contingency allowances usually range between 12 and 20 percent.

Operating and maintenance costs may be assigned to four components: support services, acquisition of supply, treatment, and distribution (Stevie and Clark 1979). Support services include the billing, collecting, meter reading,

management, and administrative functions of a water utility. Whereas support services are related to the overall integrative responsibility of utility management, the last three areas are related to the physical supply of water. The four primary functional areas can be subdivided into four major cost elements, including: payroll (labor) costs, chemical costs, power costs, and maintenance costs.

The best source of information concerning system operating and maintenance costs is available from well-maintained records of the water utility. Unfortunately, the allocation of costs to the appropriate expense category is often difficult to accomplish. Various publications that provide guidance on establishing and maintaining water utility accounting systems are available (Hay and Grinnell 1970; Fite 1980; U. S. Department of Agriculture 1977). In those cases in which no system operating experience is available, i.e. formation of a completely new water utility, the operating experience of other similar systems may be used as a guide.

Planning tools

In many cases, it may be desirable to make a planning level estimate of project costs without the benefit of preliminary engineering studies. These estimates are generally based on published data developed from a statistical analysis of the costs associated with projects of a similar nature. Most of the planning tools that have been developed, however, are oriented towards large-scale development projects and may have little validity when used for the evaluation of small-scale water utility projects. Three of the more important cost-estimating tools are discussed below.

The Office, Chief of Engineers (1980), developed a computer program called MAPS (Methodology for Areawide Planning Studies) which generates planning level cost estimates for various components of a water supply system (e.g., transmission lines, pump stations, distribution systems, storage tanks, well fields, water treatment, and surface water intake structures). The MAPS cost estimates account for many independent variables impacting the costs of the various water supply facilities. Both construction and operation and maintenance costs are given.

Gummerman, Culp, and Hansen (1979) developed cost curves for estimating water treatment costs for 99 water treatment plant unit processes. Construction and operation and maintenance cost curves were developed for plants

ranging in capacity from 2500 gallons per day to 200 million gallons per day.

Day, Wanning, and Debo (1979) prepared a handbook for persons making decisions regarding water system development. A procedure was developed to calculate a rough estimate of the capital and operation and maintenance costs for surface water and groundwater supply systems. Cost curves are presented for treatment and storage capital costs and water system annual operation and maintenance costs. Surface water treatment processes are assumed to include raw water pumping, prechlorination and postchlorination, coagulation, flocculation, sedimentation, filtration, clearwell, lagoon, and laboratory processes. Operation and maintenance costs include labor, utilities, chemicals, supplies, and miscellaneous costs.

Component costs

It must be stressed that cost curves and generalized planning tools are not a substitute for an engineer's detailed cost evaluation, particularly for small water system projects. As a general guide, however, this section presents planning level cost estimates for typical water utility components. Cost curves were developed for various components of a water utility system using some of the cost-estimating tools mentioned above. These curves are not meant to serve as a substitute for detailed cost estimates of a project, but rather they are intended to give the reader a general idea of construction costs for different size systems.

Source development. Water utility systems may develop either groundwater or surface water sources. Wells are used to obtain groundwater and impoundments along a stream or river (i.e., reservoirs) provide a surface water source. The MAPS computer program (OCE 1980) was used to generate costs for six different cases of well fields. Construction costs in July 1983 dollars are plotted against maximum design flow in Figure 8 for all cases. Case 1, or the base case, is a tubular well system drilled in unconsolidated material to 30 ft. Standard pump controls are used and the wells are housed by a simple structure. Well yield is 350 gpm per well. Case 2 is a more sophisticated, stage-constructed system. The wells are drilled in unconsolidated material to 60 ft and are arranged in a circle. The rate of drawdown is 10 ft per million gallons per day (MGD). The groundwater level is 42 ft. A test well program is included in the project costs. Cases 3 and 4 illustrate costs for a high and low yield well field, respectively. Both cases have gravel-packed wells

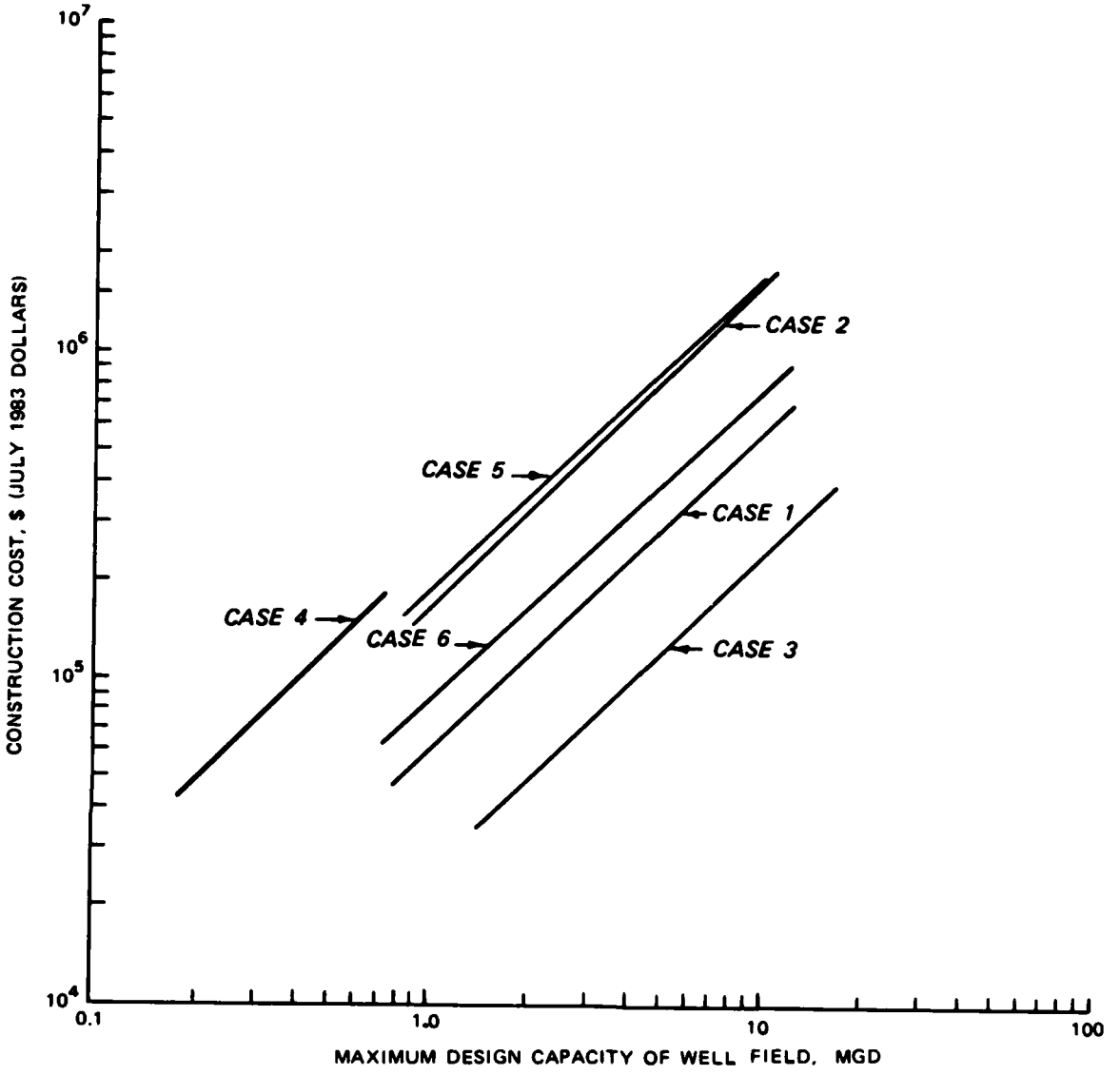

Figure 8. Well field construction costs

drilled in unconsolidated material and housed by a simple structure. Standard pumping controls are used. The yield for the high yield well field is 1400 gpm per well and 70 gpm per well for the low yield system. Cases 5 and 6 illustrate costs for deep well and shallow well systems, respectively. Gravel-packed wells were used in both cases and the wells were drilled in unconsolidated material to 900 ft for the deep wells and 60 ft for the shallow wells. Well yield is assumed to be 350 gpm per well.

Reservoir costs are complicated by several site-specific factors (e.g., dam dimensions, storage requirements, and relocation costs). Using data from

the State of Illinois originally developed by Dawes (1970) and adjusting the data by use of the Engineering News Record Construction Cost Index, reservoir cost can be represented by the following cost function

$$C/S = 18645\ (S)^{-0.4556} \qquad (2)$$

where

C/S = construction cost per acre-foot of storage (July 1983)

S = storage capacity, acre-feet

Figure 9 presents the graphical presentation of this equation.

Treatment. Water treatment costs are largely dependent on treatment requirements and plant size. For most small water systems (i.e., less than 1 MGD), a perspective on costs can be gained from the curves developed by the USEPA for package treatment plants (Figures 10 and 11). Figure 10 illustrates construction costs for a complete treatment package plant. This type treatment system is commonly used for treating surface waters and includes coagulation, flocculation, sedimentation, and filtration. Pressure filters are often used for iron and manganese removed from well waters. Construction costs for package pressure filtration plants are shown in Figure 11 for a range of plant capacities.

Storage. Storage tank construction costs (Figure 12) were calculated in

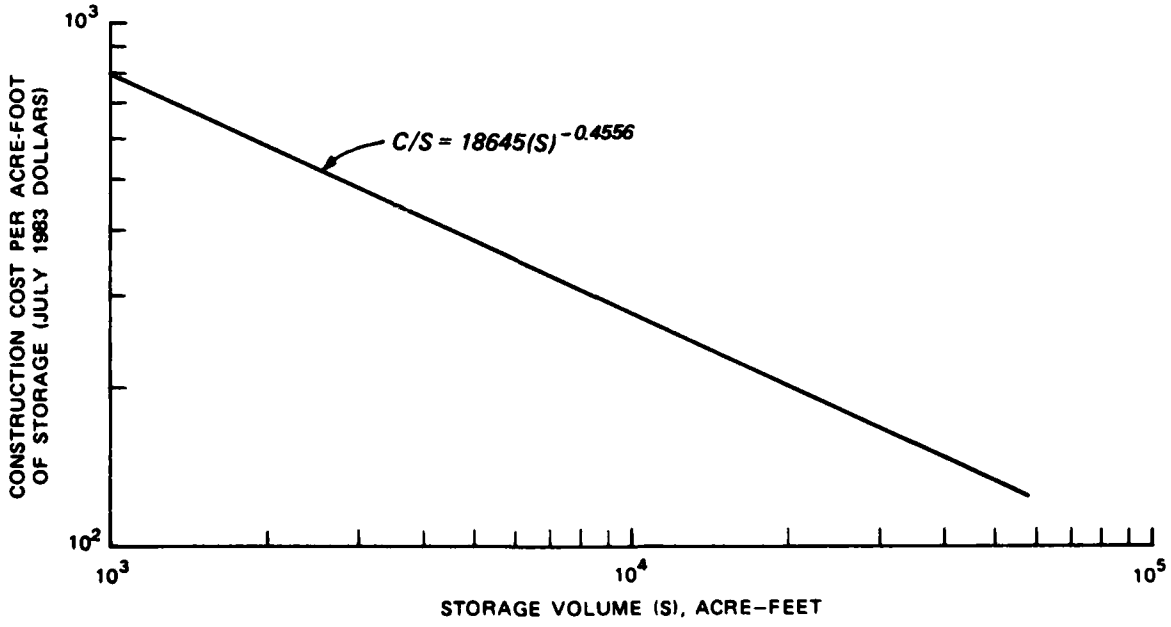

Figure 9. Typical reservoir construction costs

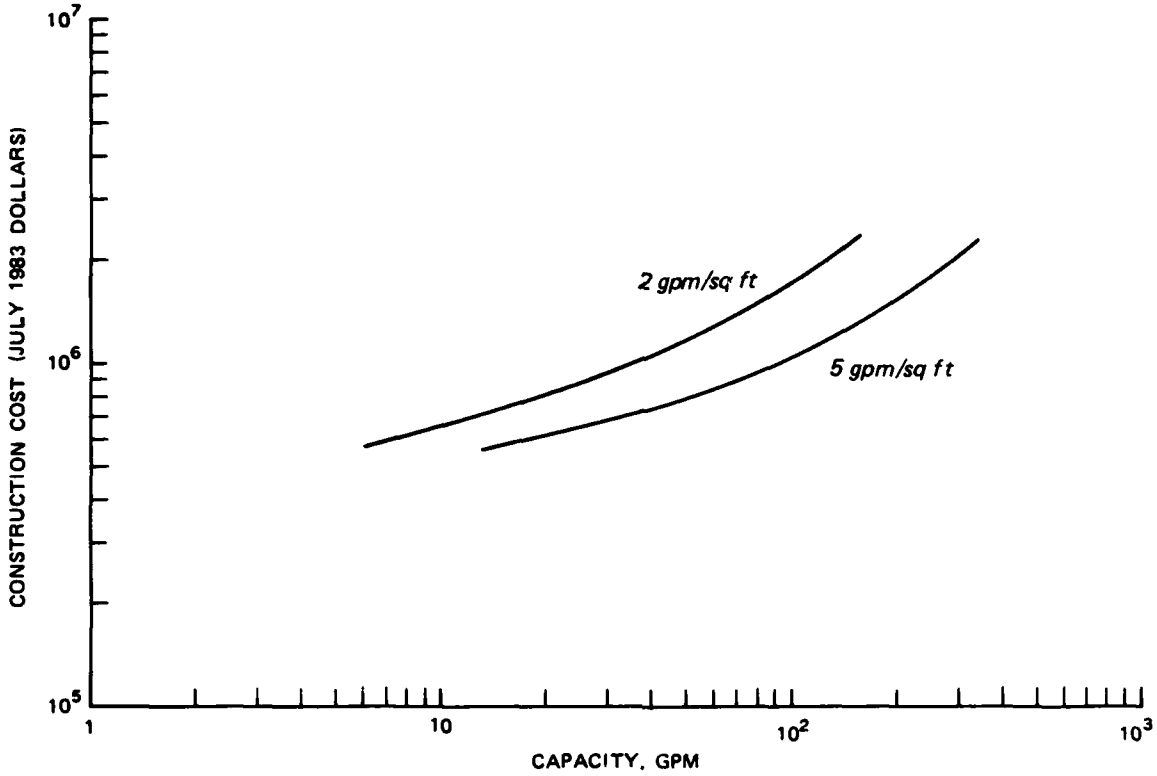

Figure 10. Construction costs for complete treatment package plants

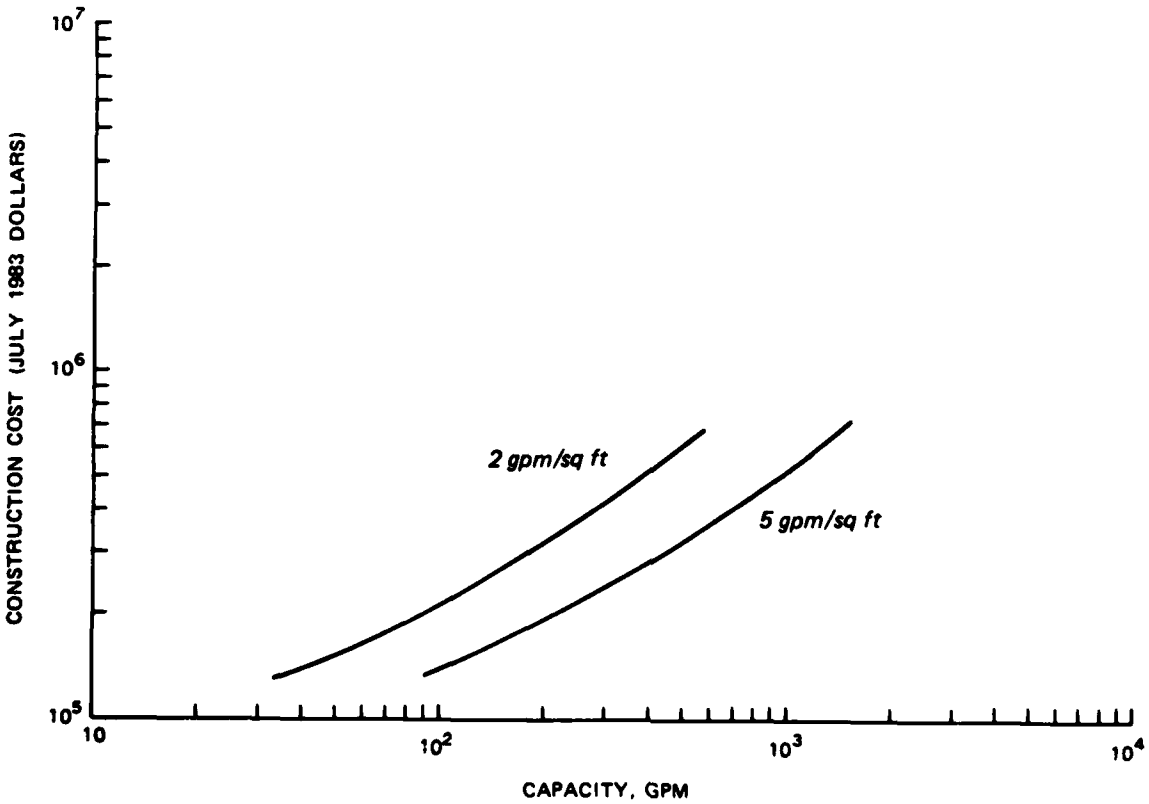

Figure 11. Construction costs for package pressure filtration plants

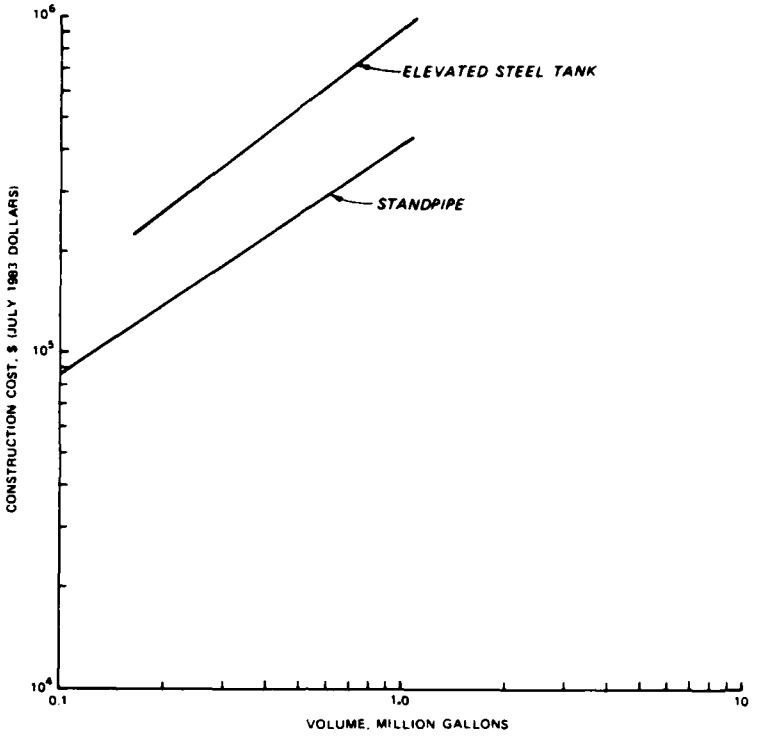

Figure 12. Typical construction costs for storage tanks

July 1983 dollars for steel standpipes and elevated steel tanks for volumes ranging from 0.1 million gal to 1 million gal. The MAPS computer program was used to determine these costs.

Transmission. An expression for estimating water transmission line costs was developed by Dawes (1970) using information from installations in the State of Illinois. Dawes states that the cost function is intended only for establishing orders of magnitude as a basis for comparisons and does not substitute for engineering cost details. The expression relating construction cost (updated to July 1983 dollars) for a water transmission line to pipe diameter and land cost is given by

$$Cp = 12.02\ D^{1.2} + k(c) \qquad (3)$$

where

Cp = total project cost per mile for a transmission line

D = pipe diameter, in.

k = land cost, $/acre

c = units of land, acres

Construction cost covers pipe cost, transportation, installation, valves, and other appurtenances that make up a transmission line.

Distribution. Distribution system costs are highly variable and depend on a number of factors. The cost of distribution systems includes the cost for pipes, excavation and backfill, appurtenances, and other miscellaneous costs. The layout of the system depends on the geology and topography of the area as well as the size and characteristics of the water supply service area.

Pipeline costs are presented in Table 3 for four different pipe materials (i.e., steel, polyvinyl chloride (PVC), ductile iron, asbestos cement). If the pipe diameters and lengths required for a distribution system are known, the values may be used to estimate distribution pipeline costs. These costs are dependent on pipe material, diameter, length, and maximum pressure. The steel pipe is assumed to have a thickness of 0.375 in. and PVC pipe costs are given for pressures less than 200 psi. Thickness class 22 is assumed for the ductile iron pipe and pressures greater than 175 psi are assumed for the asbestos cement pipes. As a basis for developing distribution system cost estimates, pipeline costs should be combined with excavation, backfill, and appurtenances costs. These latter costs, however, are highly site- and project-specific and cannot be accurately represented by generalized cost curves.

Table 3

Cost of Water System Distribution Piping*

Pipe Diameter in.	Steel	PVC	Ductile Iron	Asbestos
4	7.19	2.72	8.53	6.13
6	11.46	5.96	12.78	9.39
8	15.96	10.40	17.02	12.70
10	20.62	16.03	21.25	16.06
12	25.43	22.82	25.49	19.44
14	30.37	30.76	29.71	22.86
16	35.41	39.83	33.94	
18	40.54	50.04		
20	45.76	61.37		
24	56.44	87.37		

* Cost in dollars per foot, July 1983 (OCE 1980).

Cost summary. The total cost for construction and operation of water systems may vary widely depending on specific situations. The USEPA (1980) provides some general planning level guidance for the capital cost and operating costs of water systems according to total capacity of the system. These data are presented in Tables 4 and 5.

Table 4

Summary of Planning Level Capital Costs for Various Size Water Systems*

Capacity, MGD	Costs (in Thousands of Dollars) for Indicated System Size, MGD			
	0.1	1	10	100
Supply				
Wells	$ 80	$ 140	$1,010	$10,100
Stream or lake intake	160	180	950	7,890
Reservoirs	--	2,000	2,800	16,000
Treatment				
Chlorination	6	6	37	180
Filtration/chlorination	88	652	2,170	9,690
Sedimentation/filtration/ chlorination	134	845	3,100	17,400
Wastes disposal				
Centrifuge/haul	--	297	414	1,360
Thicken/vacuum filter/haul	--	291	502	1,710
Drying beds/haul	28	71	481	--
Liquid hauling	69	142	647	--
Transmission	Varies widely with location			
Distribution				
Pumping	150	270	1,030	6,390
Mains	Varies widely with location			
Storage	40	90	440	3,540
Administration, laboratory, and maintenance facilities	--	40	150	500

* U. S. Environmental Protection Agency (1980).

Table 5

Summary of Approximate Total Annual Costs for Treatment, Supply, Distribution, and Storage

Plant Capacity, MGD	Costs (in Thousands of Dollars) for Indicated System Size, MGD			
	0.1	1	10	100
Treatment				
Chlorination				
Debt service	1.5	0.2	0.1	0.05
O&M*	5.7	0.7	0.5	0.32
Total	7.2	0.9	0.6	0.37
Filtration/chlorination				
Debt service	33	17	5.6	2.5
O&M	24	14	3.5	2.5
Total	47	31	9.1	5.0
Sedimentation/filtration/ chlorination				
Debt service	35	22	8.0	4.5
O&M	62	14	6.0	4.9
Total	97	36	14.0	9.4
Admin., lab., & maintenance facilities				
Debt service	--	0.9	0.3	0.1
O&M	--	5.3	1.3	0.4
Total	--	6.2	1.6	0.5
Supply				
Wells				
Debt service	21	3.6	2.6	2.6
O&M	26	6.6	5.1	5.1
Total	47	10.2	7.7	7.7
Stream or lake intake				
Debt service	42	4.7	2.5	2.1
O&M	20	6.4	3.8	3.7
Total	62	11.1	6.3	5.8
Reservoirs				
Debt service	206	52	7.3	4.2
Distribution				
Pumping				
Debt service	20	3.8	1.9	0.2
O&M	20	6.5	3.9	3.8
Total	40	10.3	5.8	4.0
Transmission line				
Debt service	26	4.2	1.0	0.3
O&M	0.4	0.1	neg.	neg.
Total	26.4	4.3	1.0	0.3
Storage				
Debt service	10	2.3	1.1	0.9
O&M	0.4	0.1	neg.	neg.
Total	10.4	2.4	1.1	0.9

* O&M = operation and maintenance.

Financial Feasibility

The final decision to implement a water utility project is based on the financial feasibility of the proposed project. Financial feasibility is defined as either the ability or willingness of those served by the project to pay for the capital and operating costs associated with the proposed improvements. Financial feasibility is essentially a comparison of the costs of a proposed project with projected revenues for the water utility system. This comparison is made by developing system revenue requirements to implement the project and translating these requirements into customer charges. The estimated charges to the customer are often expressed in terms of cost per unit of water delivered, typically in cents per thousand gallons. For municipal or primarily residential systems, it is often desirable to develop estimates for the average monthly residential bill.

Financial feasibility is not only a function of the cost of the physical facilities to be constructed but is also dependent on the institutional and financial arrangements selected to provide water utility service. Available institutional arrangements within the study area are discussed in Part III of this report. Available financial arrangements are discussed in Part IV. Innovative institutional and financial arrangements are discussed in Part V. However, the impact of a particular institutional or financial arrangement can only be quantified when applied to a specific project.

The thought processes associated with the development of a financial feasibility analysis for a water utility project are illustrated by two hypothetical examples presented in Appendix B. These examples are intended to provide some insight into the consideration necessary for financially implementing a small water utility project.

PART III: INSTITUTIONAL IMPLEMENTATION

Background

Institutional implementation refers to the provisions which are made in a water service area for the ownership and operation of public water supply systems. In addition, institutional implementation includes consideration of those organizational interfaces that must take place between a prospective water utility and regulatory agencies. For purposes of this discussion, institutional implementation of a water utility may be divided into six subtopics. First, the water rights law in each state in the study area is discussed in general terms. Second, a brief description of the general powers that a management entity must have to successfully operate a water utility is presented. Third, alternative ownership forms for a water utility are discussed in detail. Fourth, the statutory authority that gives rise to the validity of water utility ownership in the various states is analyzed. Fifth, those regulatory interfaces that must be accomplished by a water utility in each of the states are identified and discussed. Finally, governmental or private agencies that can provide technical assistance services are inventoried.

Basic Water Rights Law

Law of water allocation

The right to develop a water source and use the water has the general attributes of a right in property. The law of water allocation is usually discussed in terms of the water source, i.e. surface water or groundwater.

Surface water. There are two main systems of law for allocation of water among competing users of surface water: the prior appropriation system and the riparian system. Generally speaking, the arid and semiarid western states have traditionally followed the prior appropriation rule whereas the eastern states have applied the riparian system. The divergent characteristics of these two systems are reflective of the nature of the available water supplies (Thackston et al. 1983).

The prior appropriation system is generally used in those states or regions where water is often in short supply. Under this system, the right to use a quantity of water is obtained by filing a claim with the appropriate

state agency and then making a beneficial use of the claimed water. There are three essential elements to an appropriative surface water right: first in time is first in right, the appropriator must use the quantity of surface water for which there is a valid right in a fixed number of years within a stated term or risk having the right reduced to the volume actually used, and there usually must be a diversion from the watercourse. During periods of water shortage, the oldest claims have priority and the most recent claims may be completely cut off. States sometimes also prescribe a priority of use with the intent that a lower priority use can be preempted by a higher one in the event of shortage. This system gives a few users a relatively secure supply of water, while more recent claimants may have unreliable supplies (Thackston et al. 1983).

Under the original riparian concept, a landowner adjacent to a water course is entitled to use sufficient surface water to meet his domestic needs and the needs of household animals necessary to his use of his land. The riparian right is incident to ownership of riparian land, i.e., land adjacent to or underlying the water course. As industrialization occurred, the riparian concept was expanded to allow use of adequate quantities of water for manufacturing. Each riparian owner is allowed a reasonable use of the water supply, with both surpluses and shortages shared equally (Thackston et al. 1983).

The riparian law system developed in areas where water was plentiful and reliable. Conflicts were rare and when they did arise were resolved by litigation rather than legislation. The use of water is generally restricted to riparian lands; however, consumptive uses and interbasin transfer may occur if no objections are raised by downstream riparian landowners.

Groundwater. Groundwater is often treated differently from surface water in state law and allocation systems. Historically, the definition of groundwater divides subsurface water into two classes: underground streams and percolating waters. The largest body of groundwater law has developed in relationship to the ownership of percolating waters. There are several legal theories applicable to the ownership and use of percolating water. More prominent among these are the English common law "rule of capture," the American "rule of reasonable use," and the doctrine of prior appropriation (Jarman 1983). In those jurisdictions following the English rule, a landowner could drill as many wells and pump as much water as he could without waste; he would not be liable in damages to his neighbors for depleting the groundwater supply

under their land so long as he applied the water to a beneficial use. The American rule is an extension of the English rule, holding that the overlying landowner can make unlimited use of groundwater as long as such use is reasonable. It is further required that when the rights of others are involved, that the use of the water be upon the land overlying the water or connected to some lawful purpose or occupation of the land. Some western states have adopted the prior appropriation doctrine from surface water law and applied it to the allocation of groundwater.

Water law in Alabama

Surface water. Alabama is a riparian state for the allocation of surface water supplies. Alabama imposes no statutory controls over water withdrawal, diversion, or consumptive use. Such law as exists is largely case law where the courts have dealt with water problems by default (Howells 1978). As a result, Alabama water rights law has not been clearly defined and must be determined on a case-by-case basis.

Although Alabama is clearly a riparian state, the Alabama courts have not consistently followed either the natural flow doctrine or the reasonable use doctrine. Both have been used and often mixed when circumstances required. The law of water allocation in Alabama has tended to revolve around a balancing of interests with certain classifications of use having preference. In general, mining and manufacturing have been preferred over agricultural and municipal interests (Howells 1978). Prior to 1900, case law seemed to indicate that the natural flow rule prevailed with an emphasis on the reduction of in-stream flows. As the state became more industrialized in the early 1900s, the courts began to favor the reasonable use rule that allowed some diversion and degradation of water quality by the upstream riparian owner. Today, persons or organizations wishing to withdraw water from a surface water source face a confused background of law.

Groundwater. There are few cases and minimal statutory provisions defining the groundwater law of the State of Alabama. Groundwater law appears to be based on the American rule where reasonable use of the water is the deciding factor (Howells 1978).

Administrative control of groundwater withdrawals in Alabama is limited to the licensing of well drillers and the requirement of a well completion report. In those areas under control of the Coastal Area Board, any person proposing to construct a new well or significantly alter an existing well in

order to pump more than 50 gal of water per minute must obtain a permit for construction of the well from the Coastal Area Board (U.S. Department of Commerce and Alabama Coastal Area Board 1979).

Water law in Kentucky

Surface water. Classically, Kentucky is considered to be a riparian state for the allocation of surface water supplies (Ausness and Flynn 1975). However, the enactment of the Kentucky Water Resources Law has created a scheme of statutory water use rights that is superimposed upon the older system of riparian doctrine case law (Ausness 1978).

The Kentucky Water Resources Law was an attempt to develop a comprehensive water resources development policy. Consumptive uses as well as the construction of dams and impoundments are regulated. In addition, the legislation provides for water resources planning and authorizes construction of flood control and water development projects.

One of the more significant features of the 1966 Act is the permit system by which diversions and consumptive uses of public water are regulated. The statute declares that "no person, business, industry, county, water district, or other political subdivision" may withdraw, divert, or transfer public water unless a permit is first obtained (Ausness 1978). Public water is defined by the Act to include "water occurring in any stream, lake, groundwater, subterranean water, or other body of water in the Commonwealth which may be applied to any useful or beneficial purpose." Permits are usually issued after an inspection by the regulating agency to determine whether the applicant's proposed use is consistent with statutory requirements. The regulatory agency may allow less water than the applicant has requested, and permits may be amended at the request of the regulatory agency on the permittee. Once the permit is issued, the water user must keep accurate records of all water withdrawn, diverted, or transferred. Periodic reports must be submitted to the regulatory agency.

Although Kentucky is considered to be a riparian rights state, many of the statutory provisions of the Kentucky Water Resources Law resemble elements extracted from the prior appropriation doctrine found in western states. In Kentucky, beneficial use rather than ownership of riparian land appears to be the basis of permit rights. The legislation states that no permit shall be denied "to a responsible applicant who has established an amount of water for which he has a need for a useful purpose" (Ausness 1978). In addition, there

is no requirement in the Act that the applicant be a riparian owner, and various political subdivisions, which are usually considered nonriparian in most states, are specifically mentioned as eligible applicants. The Kentucky Act also requires permits to be specific in terms of quantity, time, place, and rate of diversion, transfer, or withdrawal.

The Kentucky Act does not specify any particular time limit as the duration of the withdrawal permit nor does it contain provisions for permit renewal. This relative uncertainty is compounded since the regulatory agency could modify the permit at will. Furthermore, once a permit is obtained, older water users are not superior to newer users during periods of water shortage. The Act provides that, during periods of water shortage, the regulatory agency may suspend the operation of the permit system and temporarily allocate available water supplies on some other basis. The statutory language strongly suggests a reasonable use rule similar to that found in riparian doctrine.

The current statute has many exemptions that tend to reduce the practical impact of the law (Ausness 1978). These exempted uses include domestic users, agricultural users and irrigators, uses exempted by administrative regulation, steam-generating plants, and water injected underground in connection with oil and gas production.

The status and need for revisions to the Water Resources Law are currently under evaluation by the Kentucky Water Management Task Force administered by the Legislative Research Commission. A comprehensive report from this Task Force is expected in January 1984. It is anticipated that major revisions in the Water Resources Law may be proposed.

Groundwater. At common law, Kentucky recognizes a legal distinction between underground streams and percolating groundwater. A landowner may assert riparian rights over a groundwater only if he can prove the existence of an underground stream. Rights to percolating waters are controlled by the American rule of reasonable use (Ausness 1978).

The common law of groundwater, i.e. American rule versus English rule, has largely been replaced by the statutory requirements of the Kentucky Water Resources Law discussed above. The permitting system under this law includes regulation of groundwater as well as the previously discussed surface water.

Water law in Mississippi

Surface water. In 1956, legislation was enacted that essentially changed

the surface water law of the State of Mississippi from the riparian doctrine to the appropriation doctrine (Palmer 1983; Jarman, Sage, and Hooper 1983). Mississippi appears to be the only state east of the Mississippi River that has adopted the prior appropriation system for water rights. The statute creates a permitting system that provides for three distinct classes of users with both interclass and intraclass priorities but no preferences. The permitting system recognizes and protects both consumptive and nonconsumptive uses.

Water permitted for withdrawal must be put to a designated beneficial use. The rights of appropriators terminate when they fail to use the water for the specified beneficial purpose for a period of 3 years. Permittees may include "every natural person, firm, partnership, association, cooperative, public and private corporation, irrigation or other improvement district, and any state or federal agency" (Mississippi Code Annotated 1972). The statute does not prohibit uses away from riparian land or interbasin transfers (Putt 1981). These uses, however, would be considered in the overall permitting process. A withdrawal permit may be approved for less than the amount requested if approval of the full amount would interfere with a vested right or would be contrary to the public interest.

The statute gives the designated regulatory agency authority to establish minimum flows or water levels thus protecting in-stream uses such as recreation and navigation. During periods of shortage, priorities of use are established using the prior appropriation doctrine. As the flow drops below the total volume permitted, junior rights under the permit system give way to senior rights.

The statute also recognizes the right to construct dams and impound water, so long as provision is made for continued average minimum stream flows. In addition, such dams or impoundments must not interfere with downstream water rights. The state implemented a dam safety program in 1978.

Groundwater. Although the Mississippi State Legislature adopted a Groundwater Management Act in 1976, in general the groundwater law of Mississippi is controlled by case law (Palmer 1983; Jarman, Sage, and Hooper 1983). The Groundwater Management Act authorizes the declaration and delineation of a capacity use area where it is found that use of groundwater requires coordination and limited regulation for protection of private and public interests.

Water law in Tennessee

Surface water. Tennessee is a riparian state for the allocation of

surface water supplies. As a pure riparian rights state, there is essentially no state regulation of surface water withdrawals. In riparian rights states, water law is usually established by numerous court cases which are expected to define the many legal nuances associated with riparian law. There have been comparatively few cases in Tennessee law concerning water disputes because water has generally been in abundant supply throughout the state and few controversies have arisen. Many of the cases that do exist are archaic and have little value in describing legal concepts applicable to today's society.

There have been so few recent Tennessee cases involving water allocation that many traditional points of riparian common law are still unclear in Tennessee. Jones (1983) describes in detail the finer points of Tennessee water law. Only those deemed essential to water utility project implementation will be discussed here.

Riparian rights, the rights to withdraw water from a surface water source, are generally acquired by the ownership of land adjoining or underlying a stream. In addition, riparian rights can be acquired by adverse possession and--of particular importance to water utilities--by condemnation or purchase. The imminent domain power for condemnation of water rights has been freely given by the legislature to municipalities, counties, water companies, watershed districts, charitable institutions, water treatment authorities, utility districts, the Tennessee Department of Conservation for parks, and the University of Tennessee. The use of the power, however, is strictly and narrowly construed within the terms of the statutory authority and must be limited to a public purpose. Any claims among competing public users seem to be resolved based on appropriation theory, i.e. first in time, first in right.

Normally, the riparian water right is appurtenant to land and incident to property ownership. Even though it is often assumed that riparian water rights are inalienable from riparian land, several Tennessee cases indicate that water rights are separable. However, the only authorization to purchase water rights separate from the fee estate is given to municipalities, charitable institutions, and water companies.

Although the basic water law of the state is based primarily on case law, the Division of Water Resources of the Department of Conservation has limited administrative control of surface water resources. The Division is responsible for the conservation, protection, and development of the resources of the state, the implementation of the basic water resource policy of the state by

creating and defining the rights of respective competing users of the water resources of the state; and the determination of the waters that should be reserved for general public purposes. The only express authority given the Division concerns registration of surface water withdrawals of 50,000 gal or more per day. There is no attempt to regulate water usage, only registration is required. The registration provision also applies to anyone who renews a withdrawal which ceased the last 3 years or anyone who is currently withdrawing 50,000 gal or more per day and increases withdrawal capacity by 10 percent or more.

Groundwater. As in the case of surface water rights discussed above, there are few cases and minimal statutory provisions defining the groundwater law of the state. Tennessee appears to follow the traditional classification of underground water as either percolating waters or an underground stream. In Tennessee, all underground water is presumed to be percolating water and is allocated according to the reasonable use (American) rule.

Rights to groundwater are normally considered as property rights and it is assumed that they may be acquired by property ownership, adverse possession, condemnation, and purchase. Because of the lack of groundwater cases, few definitive statements can be made concerning Tennessee's law on acquisition of groundwater rights. However, it does seem clear that in Tennessee, if a person owns property, then groundwater rights are also acquired. There are no cases related to acquisition of groundwater rights by adverse possession or purchase. Acquisition of groundwater by condemnation can be accomplished in a manner similar to surface water rights.

Administrative control of groundwater resources in Tennessee is exercised by the Division of Water Management of the Tennessee Department of Health and Environment. Groundwater withdrawals of 50,000 gal or more per day must be registered in the same manner previously described for surface waters. In addition, water wells must be constructed by licensed water well drillers and the driller must file a report within 30 days of well completion. There is no attempt to regulate water usage.

The Management Entity

A variety of organizational structures have been used as a basis for implementing water utility projects. This section discusses generalized concepts

of the more prevalent types of organizations. The existing and future water utility systems are not referred to specifically since the type of arrangement that would best suit the needs of a particular area should only be decided when all of the local economic, political, and social factors have been considered. Rather, institutional arrangements are categorized by the type of management entity and the arrangements among entities which exist or could exist. A management entity is the agency or group which owns and/or operates a water utility (U.S. Army Engineer District, Nashville 1979).

In some cases, the management arrangements discussed already exist and the management entities have all the power and authority necessary to perform required functions. In other cases, it may be necessary to either create new entities or seek additional power or authority for existing entities. In either case, the necessary power and authority must be obtained through appropriate legal means created by state law. Specific types of entities available under current laws of states in the study area are discussed under the section on Statutory Authority (page 63).

In order to provide effective water utility service, it is necessary for a management entity to have the power, authority, and capability to perform required management functions. These functions are listed below and discussed in the following paragraphs:

a. Own the water utility facilities.

b. Administer and manage the water utility.

c. Design, construct, operate, and maintain water utility facilities either directly or by contract.

d. Raise money to finance the water utility.

e. Enter into contracts or agreements.

It is not always necessary for a single entity to be able to perform all of these functions. For example, one entity may own a facility and another entity operate it. However, some entity connected with a particular service area should be able to perform each of the functions listed above in order to provide effective and efficient service.

Ownership

The power to establish and own is the primary characteristic of a prospective water utility management entity. A detailed discussion of the types of ownership is contained in the section entitled "Alternative Ownership Forms" (page 53).

Administration and management

In providing water utility service, the management entity must be responsible to the needs of the operation and provide effective and efficient administration and management. These administration and management functions should include the provision of technical services to the public, as well as to the internal activities of the water utility such as the billing and collection of revenues and the maintenance of good accounting procedures. In addition, all public health related regulatory requirements must be met in order to provide high quality water to the consuming public.

For a water utility to function properly, there should exist written rules and regulations by which to operate. Such rules and regulations may include such items as standards of service, policy on line extensions, metering standards, and rate structure. The individual state public service commissions usually publish general operating rules and regulations that may be used as a development guide. These rules should be compatible with planned development in individual water utility service areas. Consideration must be given to interfacing with other management entities and public agencies active in the prospective service area.

Design, construction, operation, and maintenance

A management entity owning or operating water utility facilities will eventually need the capability to design and construct new facilities or modifications or expansions to existing ones. In addition, it will certainly need to be able to operate, maintain, and repair the facilities under its control.

Financing the system

Any management entity providing water utility service must have the legal authority to obtain funds to finance the construction and operation of the system. It is the responsibility of the management entity to see that the financial burden of the water utility system is distributed on an equitable basis. Next to ownership, system financing is usually the major issue in implementation of a water utility project. Water utility financing is discussed in detail in Part IV of this report.

Contracts and agreements

Another major function of a management entity is the ability to enter into contracts or agreements with other entities. The agreements may be for managerial or administrative purposes, such as one entity relinquishing the

management of its service district to a neighboring entity, or several entities combining to form a consolidated service area. Also, under this category, an agreement may be effected between two entities providing for a connection between two service areas to augment the supply of one area or to serve as an emergency standby.

Alternative Ownership Forms

Before an entity can supply public water service, it should have the authority to own and operate water utility facilities. In considering the ownership of water utility facilities, it should be noted that portions of the total system may be owned by separate entities. For example, the source of water and the treatment facilities may be owned by one entity. This entity in turn might provide water for distribution to another that would own treated water storage and distribution facilities. Thus, ownership of water utility facilities can apply separately to the source of water, the transmission facilities, the treatment facilities, and/or the storage and distribution facilities. Also, it should be noted that a single management entity may be involved in providing more than one type of utility service to a community, i.e. water, wastewater, gas, solid waste collection, etc.

Water systems may be either privately or publicly owned. Rural water systems which are cooperatively owned by the individuals served are considered to be publicly owned for purposes of this study. Privately owned water systems are operated as a business, including the methods of day-to-day operations and in relationships with employees.

Except for new systems, the decision on private versus public ownership was made long ago. Any decision made now to change ownership is likely to stem from financial or political considerations. One common reason for considering a possible change in ownership is that the owner cannot afford the necessary improvements to the water system. The motivation for such change may originate with the owner who wants to be free of a financial burden, or from water users who are dissatisfied with water quality or water service and want to improve the system (USEPA 1980).

A privately owned water utility may be organized as a corporation, partnership, or a sole proprietorship (single owner). The corporation is the predominant form of privately owned water utility. Ownership of a corporation is

generally vested in a group of stockholders who control the operation through a board of directors and, ultimately, a chief executive or president. Day-to-day operation can be managed by a full or part time operator or a lease-service arrangement. The manager would report to the owner or board of directors.

For a publicly owned utility, the community property owners or taxpaying public usually represent the controlling body. In this case, control is generally exercised through elected officials, who may in turn appoint the manager of the utility. Organization of a publicly owned utility may vary greatly, depending on specific needs and enabling legislation. The water utility may be incorporated into other city or municipal departments, or be organized as a separate institutional unit, such as a district, board, or authority, which is relatively autonomous with respect to other municipal management functions. In addition, it may be part of a regional authority.

In the early days of public water supply, private ownership was the predominant institutional form. Over the years, however, the balance between private and public systems has changed until today there is a rather stable 70:30 ratio between public and private ownership in the water utility field (AWWA 1959). The trend toward public ownership has resulted because:

a. In small communities or rural areas the provision of water service does not offer sufficient incentive to attract private enterprise.

b. In larger communities and rapidly growing urban areas, capital investment requirements cannot be met by privately owned utilities while maintaining a water rate that customers can pay.

The prime considerations concerning utility ownership are institutional, management efficiency, ability to provide needed services, and profit. Overall, privately owned systems have an excellent track record, and, in certain cases, a privately owned organization represents a more efficient alternative to public ownership.

Public ownership is not always feasible but is generally preferred when a private investor cannot operate effectively under the associated constraints of low profit margins and large capital investments. Furthermore, many operations are often best organized as a subdivision of, or jointly with, other municipal services and governments. In small cities, many operating responsibilities, such as accounting, billing, and reporting, can be combined with other municipal services. Public responsiveness of public-owned water utilities may be better than that of private water companies. In addition, public water systems may be eligible for state and Federal assistance not available

to private companies. The trade-offs between private and public ownership are summarized in Table 6.

Table 6

Advantages and Disadvantages of Public and Private Ownership

Alternative	Advantages	Disadvantages
Private ownership	Profit motive	Taxable
	Autonomous from municipal government	Cannot raise revenue through taxation
	Not affected by debt limitations of municipal government	Low profit margin complicates investment and management
		Failure by utility regulatory agencies to allow recovery of fire protection costs in rate structures may limit ability to provide fire protection
Public ownership	Generally lower rates due to exemptions	Political constraints
	Higher exposure to public	
	Can sell tax exempt bonds at low interest rates and obtain government grants	
	Can obtain income through taxation	
	Can better utilize income from customer contributions	

The differentiation between private and public utilities is often of little significance to the customer. However, the differentiation is a most important determinant of the interactions that take place between the water utility and regulating agencies, assistance agencies, and the financial community. For each community the decision regarding public versus private ownership should be based on the ability of the selected ownership form to supply the best service at least consumer cost under local conditions.

Under each of the broad categories of ownership, there are a number of subcategories based on the legal nature of the entity formed to provide the

service. The more predominant of these subcategories are discussed below.

Private ownership

The basic legal forms of private water utility ownership include the sole proprietorship, the partnership, and the corporation. Each of these has associated advantages and disadvantages which are discussed below (McConnell 1963).

Sole proprietorship. A sole proprietorship is simply an individual in business for himself. The proprietor owns or obtains the materials and capital equipment used in the operation of the business. Typically, he personally supervises the operation of the business.

The simple nature of the sole proprietorship type of organization has certain distinct advantages:

a. A sole proprietorship is easy to organize.

b. The proprietor is his own boss and as such can set policy and has complete freedom of action.

The sole proprietorship also has many disadvantages that militate against its use as a means of implementing a water utility project:

a. The financial resources of the sole proprietorship are usually insufficient to permit a large-scale enterprise. This is particularly true of the capital-intensive water utility industry. Finances are usually limited to what the proprietor has in the bank or is able to borrow.

b. The proprietor must make all basic decisions concerning buying, selling, and acquiring maintenance and administrative personnel, as well as the technical aspects of the operation.

c. The proprietor is subject to unlimited liability. The individual risks not only the assets of the firm but also his personal assets.

Partnership. The partnership is a form of business organization wherein two or more individuals agree to own and operate a business. The partners pool their financial resources and business skills. Similarly, they share the risk and the profits or losses that accrue to them.

The advantages of a partnership are essentially the same as those associated with the sole proprietorship:

a. The partnership is relatively easy to organize.

b. Managerial functions can be apportioned among the partners in accordance with their abilities and training.

c. Financial resources will generally be somewhat greater than the sole proprietorship.

The partnership also has several distinct and significant disadvantages:

a. Since several partners usually participate in management activities, inconsistent or divided policies may lead to inaction when action is required.

b. Although generally superior to the sole proprietorship, the finances of partnerships are still limited. Financial limitations represent the greatest drawback to the use of the partnership for implementing a water utility project.

c. The continuity of a partnership is very precarious. The death or withdrawal of a partner usually entails dissolution and reorganization of the firm.

d. Each partner is liable for all business debts incurred by the firm.

Corporation. A corporation is a legal business entity distinct and separate from the individuals that own the corporation. The corporation may be viewed as a governmentally created "legal person." The corporation can acquire resources, own assets, produce and sell a product, incur debts, extend credit, sue and be sued, and carry on all those functions which any other type of enterprise performs. The corporate form of business enterprise is the dominant form in the water utility industry.

The major advantages of the corporate form of enterprise include the following:

a. The corporation is the most effective form of business enterprise for raising capital. The sale of stocks and bonds allows the enterprise to raise large sums of money. Corporations ordinarily have easier access to bank credit than do the sole proprietorship and partnership forms of ownership.

b. The owners of the corporation (shareholders) have limited liability, i.e. they risk only what they paid for stock. Their personal assets are not at stake.

c. As a legal entity, the corporation has a life independent of the owners.

d. Corporations usually have the ability to secure more specialized and therefore more efficient management than sole proprietorships and partnerships.

e. The corporate form of enterprise may offer distinct tax advantages.

Although the corporation is the dominant form of private ownership in the water utility industry, primarily because of its ability to raise large sums of capital, there are several disadvantages associated with the corporate form:

a. The formation of a corporation requires substantially more legal expense.

b. Because the corporation is a legal entity, it is subject to certain abuses. Primarily, unscrupulous businessmen have used the corporate form to avoid personal responsibility.

c. The corporate form of business enterprise has some tax disadvantages.

Public ownership

A variety of organizational arrangements have been used by public entities to provide water utility service (Water Pollution Control Federation 1973). When public ownership is the selected means of providing water treatment and distribution, the responsibility for performance usually rests with a body of elected or appointed officials, ranging in scope from the semiofficial subdivision development board to large multipurpose metropolitan or regional authorities. Many of these bodies exist solely for the purpose of administering water supply facilities, while others may also administer other areas of concern such as wastewater collection and treatment or solid waste collection. Some of the more common forms of a public water utility are single communities, joint ownerships, contracts for service, special purpose districts, multipurpose districts, independent authorities, state or regional governmental authorities, and associations.

While the eight organizational structures discussed below are not the only means of providing public administration of a water utility, they represent the majority of cases. Other arrangements, as modified by local laws and/ or dictated by unique situations, can and do provide efficient mechanisms for water utility administration. The formation and functioning of such organizational arrangements are governed by statutory limitations or require special legislative action.

Single communities. Perhaps the most common method of providing service is that of single community ownership, operation, and administration of the water supply facilities, where the treatment and distribution of water are considered to be a municipal service to the community in the same manner as police and fire protection.

The governing bodies of many communities exercise the administration of the water utility directly through municipal public works departments, separate water departments, engineering staff, clerks, or managers. In other cases, the administration may rest with an appointed board, committee, commission, or similar body. Generally, the elected municipal officials retain the ultimate responsibility for policy and review procedure even though the appointed board exercises much of the decisionmaking.

In particularly large communities, a separate body is elected to exercise control over water supply facilities.

Joint ownerships. Occasionally, two or more communities or a community and another entity (such as a governmental agency) have constructed and jointly operate water supply facilities. The individual local governing bodies define the procedures for administration and financing and usually create a joint governing body comprised of elected or appointed officials from the cooperating governmental units.

Joint ownership and operation of facilities differs from the district concept (discussed subsequently) in that vested title remains with the individual cooperating units in proportion to their expenditures. Indebtedness is incurred by the individual governmental units rather than by the joint body.

Apportioning of cost among the participants in a joint ownership agreement is usually defined in the agreement. The apportionment formula may differ for capital costs and operating costs. Costs are normally apportioned to the individual governmental units who in turn make the necessary charges to their users.

Joint ownership, rather than formation of a special or multipurpose district, is advantageous in the case where a small number of communities, located adjacent to or close to one another, join to take advantage of the lower cost of constructing source development, treatment, or transmission facilities. In those cases where a large number of communities are involved, the joint ownership approach tends to become rather cumbersome to control and administer.

Contracts for service. In cases where a water utility is asked to provide service to an area outside the utility's existing service area, such as a municipal system serving suburban development, a contract for service may provide an acceptable method of organization. The contract for service approach allows for intercommunity cooperation, on either a temporary or permanent basis, without the necessity of reorganizing the original water utility. The key to utilization of this approach is the mutual agreement by the respective entities on the terms of the contract which should clearly define the quantity and standards of service, the determination and magnitude of charges, the liabilities of the contracting agencies, the duration of the agreement, and the provisions for renegotiation.

The contract for service approach is particularly advantageous for temporary service to a growing community until development indicates the need for provision of local facilities, but it is also widely used as a means of long range agreement between communities, districts, and other entities as a basis

for the use of facilities. The contract for service may be useful and mutually advantageous in the area of municipal-industrial cooperation in the construction of facilities. Based on long-term contracts with an industry, municipalities can use their bonding capacity, particularly revenue bonds, to construct and finance the facilities required by the industry.

In general, the contract provisions for service outside an entity's existing service area must be approved by the state public service commission or similar regulatory agency before the contract may become final. This aspect of the contract for service approach is discussed below under the section on "Regulatory Interfaces" (page 71).

A major problem associated with the contract for service approach is representation. In general, the secondary contracting party is not involved in the policy decisions of the water utility providing the service, even though these policy decisions impact upon the secondary party as well.

Special purpose districts. Although political boundaries play an important role in the development of water utility service, topographic and demographic considerations are frequently more important in the solution of a water supply problem. The cooperative effort of a number of communities in solving a common problem has given rise to the special purpose district.

The district approach is similar to joint ownership; however, the governing body of the district is usually given more power for combining the resources of and providing planning for the participating communities. The special purpose district concept for the provision of water supply is particularly suited to situations requiring a large capital expenditure for joint works or where resource allocation will be critical. The organization for such a district must provide for a method of joint financing, including the apportionment of benefit charges; a basis for administrative organization for the planning, construction, and operation of district facilities; and a means for altering boundaries, enlarging facilities, or otherwise managing the affairs of the district.

The water utility district is usually organized with an elected or appointed board that is representative of the communities involved and has the authority to levy or collect charges as required to finance the district's needs. The ability of the district to undertake debt to finance the district's capital improvements is controlled by the implementing legislation under which the district is formed. In some cases, bonds are issued in the

name of the district; however, the bonds are backed by the full faith and credit of the participating communities. In other cases, the district does not issue bonds directly; rather, the participating communities finance their district obligations directly.

The function of the water utility may be general or limited in nature. The water utility with general authority is responsible for the construction, operation, and maintenance of all water supply facilities including an individual community's distribution facilities within the district's service area. The limited district is primarily involved with the construction, operation, and maintenance of those water supply facilities servicing more than one community and rarely concerns itself with an individual community's facilities.

Multipurpose districts. The organization and functioning of a multipurpose district are similar to those of the special purpose district; however, several district areas of concern are incorporated into the responsibilities of the district. A multipurpose district is generally formed to approach intergovernmental problems in many areas, of which water supply could be one. There are a number of such district arrangements currently operating, the functions of which, in addition to water utility operation, include such endeavors as wastewater collection and treatment, irrigation, solid waste disposal, flood control, and navigation. Generally, it has been found that those areas suffering from water supply problems are similarly in need of community cooperation on other matters.

One of the problems of the multipurpose district approach is the delineation of district boundaries to include those communities or areas having common problems, without excluding communities or areas in need of a cooperative approach on a limited number of problems. For example, if the district were organized to function in the areas of water supply, water pollution control, and flood control, the communities located on higher ground may be in urgent need of improved water utility service but not particularly interested in the flood control function that may be of major interest to a community located on lower ground.

The advantage of a multipurpose district over a special purpose arrangement is in the economics effected by the utilization of equipment, skills, and administration common to a number of similar but separate problems. In addition, improved coordination of planning is achieved by functioning in related areas.

Multipurpose districts usually meet their revenue requirements through a combination of assessments made on the district as a whole and the application of service charges for the various services provided by the district.

Independent authorities. An authority is organized to construct and operate public facilities of a revenue-producing nature and is generally limited to the collection of service charges for services rendered and the issuance of bonds that are payable solely from these revenues without recourse to taxation. An authority may be organized with or without geographical limitations and may overlap a number of local jurisdictions. In some cases, an authority may even cross state lines.

The fact that authorities generally have no taxing power is beneficial in that they are not usually affected by debt limitations imposed on communities included in the authority's jurisdiction. This same lack of taxing power, however, generally requires the issuance of revenue bonds with their inherently higher interest rates. In addition, the orderly construction of treatment and distribution facilities large enough to anticipate future growth may be impossible if an authority can only derive income from present users. This difficulty, however, has been overcome in some cases by allowing the authority to charge both property via taxes and users for the respective benefits.

Regional agencies. The creation of regional governmental agencies for the development and distribution of water has become popular in recent years. Typically, these agencies are otherwise involved in regional government, planning, coordination, or similar endeavors. The agencies normally administer the water utility for a metropolitan area, river basin, or other geographically delineated area. In most cases, the regional agency is involved with the source development aspects of water supply. In some cases treated water may be sold to individual communities in the agency's area of operations. Rarely has the regional agency become involved in the construction, operation, and maintenance of an individual communities water distribution system.

The most obvious advantages of the regional agency concept are the centralized control of water supply development, standardization of equipment and procedures, maintenance of highly trained personnel to provide expertise on operating problems and procedures, and centralized laboratory facilities. Perhaps the most difficult aspect of the regional agency concept is the fair and equitable distribution of costs to the communities within the agency's area of operations.

Associations. The association is a cooperative venture in which the water utility is owned by the individuals served by the system. These associations are generally formed as nonprofit corporations under the general business laws of a state. Associations are a popular form of water utility organization in rural areas.

Statutory Authority

The previous section presented descriptions of generic forms of water utility ownership and/or management. The authority and power to organize a water utility flow from the state to the local entity. Presently, under the laws of the various states in the study area, there exists a variety of entities that have the power and authority to supply water to the public. To varying degrees, these entities can efficiently perform the functions necessary to provide water utility service. This section describes those entities currently available in the various states to provide water utility service.

Alabama

Several public entities in Alabama are statutorily authorized to provide water utility service. These entities include municipalities, water authorities, and water districts (Kimmelman 1978). In addition, nonspecific statutory authorization is also available that enables privately held companies to provide water utility service (Alabama Code Annotated 1975).

Municipalities. Cities and towns have the right to establish, purchase, maintain, and operate waterworks or contract for a supply of wholesome water for their inhabitants. Cities and towns operating a water plant are authorized to contract with and sell water to other municipalities and residents thereof. A municipality is authorized to construct, purchase, operate, maintain, enlarge, extend, and improve waterworks plants and systems or any part or parts thereof, whether located within or without or partly within or partly without the corporate limits of such municipality. A municipality may furnish and distribute under contract water to persons, firms, and corporations in such municipality and to persons, firms, and corporations in the territory surrounding such municipality, whether or not the territory surrounding the municipality is contiguous thereto. There is apparently no distance limitation on the area a municipality may serve outside of its corporate boundary. A municipality is authorized to condemn for its use sources of water and water

supplies or necessary watersheds, rights-of-way for its pipelines, and lands for its water reservoir anywhere in the state.

General supervision and operation of the municipal water utility can be accomplished by either the governing body of the municipality or by a public corporation established in accordance with statutory requirements. A public corporation can be organized upon application of three persons to the governing body of the municipality for authority to incorporate such a public corporation for the purpose of operating a waterworks plant or system. The governing body of the public corporation is a three- or five-member board of directors elected by the governing body of the municipality.

Water authorities. A water utility authority can be organized upon written application of three persons to the governing body of the county in which the area or areas to be served by the proposed authority is located. The proposed service area must lie wholly within the boundaries of the county with whose governing body the application is filed. The service may lie within or without or partly within and partly without the boundaries of any municipality in the county. Among other administrative requirements, the application for the incorporation of the authority must include a statement that there is no public water system adequate to serve any area in which it is proposed that the authority will render water utility service.

The authority is governed by a board of directors consisting of three or more members elected by the governing body of the county in which the authority is organized. Directors serve a 6-year staggered term.

Water districts. A water utility district can be organized upon filing of identical written applications with the governing body of each municipality and county located in whole or in part within the boundaries of the area or areas to be served by the proposed district. Functionally and organizationally, the water utility district is similar to the water utility authority. The primary differences are related to the initial organization of the two entities.

Whereas the water authority is a single county entity, the water utility district can be multicounty in nature. Each county in which any service area of the district is located must approve the existence of the district by resolution. Whereas the water authority must certify that there is no public water utility within any part of the service area which can perform the required service, there is no such requirement on persons wishing to organize a

water utility district. Finally, the water district must provide a list of all municipalities or counties located in whole or in part within the proposed boundaries of the district.

The water utility is governed by a board of five or more directors. The board of directors includes at least one director elected by the governing body of each county or municipality where the application for incorporation as a water utility district is filed. The term of office for each director is 4 years. The board of directors may be organized such that the terms of the individual directors expire at the same time or, at the discretion of the governing bodies of the county or municipalities, can arrange for staggered terms.

Privately held companies. Privately held utilities may also provide water utility service. Although sole proprietorship and partnership companies are legally possible, the predominant forms of privately held utilities in the state are the "utility association" and the for-profit corporation. The water utility association is actually a nonprofit corporation organized under the Alabama Non Profit Corporation Act (Alabama Code Annotated 1975) which authorizes the incorporation of nonprofit corporations for any lawful purpose or purposes. Water utilities are not specifically cited in the Act. These "associations" are voluntary membership organizations. The nonprofit corporation may be formed by three or more natural persons of 19 years or older by filing petitions with the judge of probate in the county in which the principal office of the corporation will be located. Affairs of the corporation are managed by a Board of Directors.

For-profit corporations may be organized under the Alabama Business Corporation Act (Alabama Code Annotated 1975). One or more persons, partnerships, domestic corporations, or foreign corporations may act as the incorporator. Petitions for incorporation are filed with the judge of probate of the county in which the corporation is to have its initial registered office. The judge of probate will file the petition with the Secretary of State. These for-profit corporations are fully regulated by the Alabama Public Service Commission.

Kentucky

Four entities in Kentucky were identified as having the statutory authority to provide water utility service. These entities include municipalities, water districts, nonprofit water associations, and investor-owned companies.

Municipalities. Municipalities in the State of Kentucky are divided into classes, first through sixth class, each with distinguishable statutory authority to provide water utility service. In general, all municipalities are authorized to purchase, establish, erect, maintain, and operate waterworks, together with the extensions and appurtenances thereto, within and without the corporate limits of the city, for the purpose of supplying the city and its inhabitants with water (Kentucky Code Annotated 1982). Any city may also acquire a franchise or contract to furnish water utility service to any other city in the same manner as a private corporation or individual may acquire such a franchise or contract. Any city that owns or operates a water supply system may extend the system into, and furnish and sell water to any person within, any territory contiguous to the city.

Cities of the second class that own a waterworks may operate such waterworks as a department of the city, or may appoint a commission to operate such waterworks. This commission, called the Commissioners of Waterworks, is composed of three to five members appointed by the mayor, subject to approval of the city legislative body.

Water districts. Subject to the specified statutory provisions, any county judge or executive, upon petition of 25 resident freeholders of the proposed district, may establish a water district and appoint water commissioners for the purpose of furnishing a water supply to the citizens of the county. The petition must describe the territory intended to be included in the district and must set out the reasons a water district is needed. If the county judge or executive finds that the establishment of such a district is reasonably necessary for the public health, convenience, fire protection, and comfort of the residents, he can order the establishment of the district, designating same by name and number. The county judge or executive has the latitude to modify the proposed service area or dismiss the petition.

The water district is administered by a board of commissioners which controls and manages the affairs of the district. The board of commissioners for single county districts will consist of three members serving 4-year terms. Multicounty districts will have a board of commissioners consisting of from three to five members. Members are appointed by the county judge or executive.

Provisions are available that permit a district to be expanded, include incorporated areas, merge with another district, and in association with one

or more other districts or cities jointly acquire and operate sources of supply of water.

Water associations. A water association is a nonprofit corporation organized under the general corporation laws and rules of the state (Commonwealth of Kentucky 1981). These associations are organized as nonstock, nonprofit corporations. Although the relevant statutes do not specifically list a water utility as an example of such an activity, it is well settled that the furnishing of a water supply is within the "any lawful purposes" phase of the purpose section of the appropriate statutes. In Kentucky, a nonshare, nonprofit corporation can be incorporated by one or more persons signing and delivering articles of incorporation in triplicate to the secretary of state.

Investor-owned companies. Water utilities organized as investor-owned, for-profit corporations can be incorporated under the provisions of the Kentucky Corporation Law & Rules (Commonwealth of Kentucky 1981). A corporation may be formed by one or more persons by signing and delivering to the secretary of state the required forms. Although water utilities are not specifically included in the statutes, corporations may generally be organized for any lawful purpose. Water utilities organized as for-profit corporations do not appear to be a significant factor in Kentucky.

Mississippi

In Mississippi, there are several types of entities that can legally provide water utility service to the public. These include municipalities, water districts, nonprofit water associations, and privately owned for-profit companies. In addition, several other entities have authority to supply water for specialized purposes; these, however, will not be covered in this report.

Municipalities. Municipalities are empowered to provide water utility services by the state both within and without the corporate limits. Management of the municipal water utility can be performed by the governing body of the municipality or through a board of commissioners appointed by a majority vote of the governing body. Service may be provided to consumers residing outside of and within 5 miles of the corporate limits of the municipality. Whenever such service is provided outside of the corporate limits, the consumer cannot be charged at a rate greater than twice the rate charged for such services within the municipality. Furthermore, service beyond 1 mile from the corporate limits is regulated by the Public Service Commission.

Water districts. There is no specific statutory authority for county

government to provide water utility service. However, any contiguous area within a county, but not within the limits of a municipality, that is not served by an adequate water system can become incorporated as a water district in order to provide water to residents within the district. The Board of Supervisors of a county may, in its discretion, initiate the incorporation of such a district by resolution after being presented with a petition signed by at least 25 property owners residing within the borders of the proposed district. However, at least 40 property owners must reside within such a proposed district. The Board of Supervisors must hold a public hearing upon the question of the public convenience and necessity of incorporating the proposed district. Upon finding that the creation of such a district is economically sound and required by the public convenience and necessity, a resolution forming the district is adopted. If 20 percent of the qualified electors of the proposed district file a written petition opposing the creation of the district, a special election must be held. Once the district is officially created, the Board of Supervisors appoints a five-member Board of Commissioners which has the sole power to legally operate, manage, abolish, or dissolve the district.

Nonprofit water associations. A popular form of water utility in Mississippi, particularly in rural areas, is the "rural water association." These associations, in general, are nonprofit membership corporations incorporated under the general corporation laws of the state. The relevant statute for nonprofit membership corporations specifically lists corporations to own and operate rural water works systems as an example of those organizations that can be established. Incorporation can be accomplished on application of any three members authorized by the minutes of the organization to apply for the charter.

In addition to the general requirements pertaining to the incorporation of a nonprofit corporation, several special provisions relate specifically to corporations established to provide water service. Before any nonprofit corporation can construct, operate, or maintain a water transmission or distribution system for the sale of water to the public, it must obtain a certificate of public convenience from the Public Service Commission. The public service commission approves the limits of the proposed service area. Each rural water company must maintain a roster of all members which includes the date upon which each member joined and periodic data as to services rendered by the

water company. Nonprofit corporations providing water utility service can merge upon concurrence of a majority of the membership of each merging corporation.

For-profit companies. Water utilities organized as for-profit corporations can be organized under the provisions of the Mississippi Business Corporation Law (Secretary of State 1981). This statute allows organization of a business corporation for profit for every lawful purpose and of every kind, with few exceptions.

Because of the low profitability of such firms, water utilities organized as for-profit corporations are not a significant factor in Mississippi. The predominant use of the for-profit corporation has been associated with water supply for large housing developments being constructed in areas not serviced by preexisting systems.

For-profit corporations organized to provide water utility service are regulated by the Public Service Commission. The Commission regulates service areas, rates, and service. Prior to the construction or operation of a water system, the corporation must obtain a certificate of public convenience and necessity from the Commission and develop an approved rate structure.

Tennessee

In Tennessee, there are several basic types of entities that can legally provide water utility service to the public. These include cities or municipalities, counties, utility districts, utility associations, privately owned water systems, and water authorities.

Municipalities. Municipalities are empowered to provide water utility services by the state both within and without the corporate limits. Management of the water utility can be performed by the governing body of the municipality or through a board of commissioners appointed by majority vote of the governing body. Day-to-day operation of the system is usually accomplished through a superintendent and his staff of civil servants. The service area of the municipality must be within the state and within a radius of 20 miles from the territorial boundary of the municipality. Implementation of a joint project could be used to bypass the service distance limitation.

Counties. The various counties of the state are authorized to establish, construct, install, acquire, and maintain urban type public facilities in any area within their borders. The term "urban type public facilities" includes water supply and distribution systems. The power to provide these facilities

is exercised by resolution of a majority of the county governing body. The exercise of the powers can be either by some agency of the county already in existence, a public works department to be created, or by a board of public utilities. General supervision and control of the acquisition, improvement, operation, and maintenance of the urban type public facilities are in the board of public utilities or other agency. The immediate management and operation of the facilities are handled by a superintendent appointed by the board of public utilities or the county governing body. The county may not extend any public facilities within 5 miles of any part of the boundary of an incorporated city or town unless the city or town takes the required action within 90 days of being petitioned by the county governing body to provide such service.

Utility districts. A utility district can be established by the governing body of the county where the service is to be supplied upon petition of 25 owners of real property who reside within the boundaries of the proposed district. Upon proper hearing and notice, the county governing body determines whether the public necessity and convenience requires that the district be created. The territory served by the utility district can be solely within the boundaries of one county, or can embrace territory in two or more counties. For multicounty districts, the petition may be submitted to the governing body of any one of the counties situated in whole or in part in the proposed district. The existing board of commissioners chooses its replacement, thus making the board essentially autonomous. Statutory provisions, however, are available for removal of commissioners.

Utility associations. The utility association is a nonprofit corporation established under the general corporation laws of the state. It is generally used in rural areas. The utility association is a voluntary organization.

Privately owned companies. Privately owned companies may also provide water utility service. These are generally incorporated bodies established under the general corporation laws of the state. Privately owned companies are under the jurisdiction of the state Public Service Commission.

Water authorities. The entities mentioned above can combine to form a water authority. The general supervision of a water authority is vested in a Board of Commissioners. The water authority derives its authority from the entities that combine to create the authority. As a result, the authority is directly accountable to the entities comprising the authority.

Regulatory Interfaces

Regulatory interfaces are those interactions with other organizations or agencies that require the utility to perform in accordance with Federal or state laws or regulations. Typically, these include administrative type agencies such as state public service commissions or health related agencies such as state departments of health. Only those agencies or organizations having a substantial direct impact on water utility formation and operation are considered here. A complete discussion of all agency interfaces such as regulations of the Occupational Health and Safety Administration (OSHA), Social Security Administration, and Fair Labor Standard Act is beyond the scope of this study. These types of laws and regulations are more related to development of overall management requirements rather than implementation at the policy level.

Federal regulation

Five Federal laws in particular are likely to have direct impact on the implementation and operation of a water utility within the study area. These include the Safe Drinking Water Act, the National Environmental Policy Act of 1969, the River and Harbor Act of 1899, the Tennessee Valley Authority Act, and the Clean Water Act.

Safe Drinking Water Act. The Safe Drinking Water Act (SDWA) is important to the implementation and operation of a proposed or existing water utility as it establishes a regulatory scheme for setting and enforcing national drinking water regulations for all public water systems (Public Law 93-523).

The primary purpose of the SDWA and its accompanying regulations is to establish maximum contaminant levels for public drinking water to ensure that public water supplies do not endanger human health. In addition, the law and implementing regulations establish monitoring techniques and enforcement procedures. Maximum contaminant levels have been promulgated for organic and inorganic chemicals, turbidity, coliform bacteria, radium, and photon radio activity.

The SDWA allows delegation of primary enforcement responsibility to the states as long as the state has adopted drinking water regulations and implemented procedures that are consistent with those promulgated pursuant to the SDWA. All states within the study area (Alabama, Kentucky, Mississippi, and Tennessee) have obtained primacy under the SDWA. The designated state

administering agency is discussed under state regulation below.

Under the SDWA, the USEPA retains oversight authority in the states' administration of the Act. All states within the study area are in USEPA Region IV. Inquiries concerning the SDWA may be made to:

U. S. Environmental Protection Agency
Region IV
Water Supply Branch
345 Courtland Street
Atlanta, GA 30365
(404) 881-3781

The USEPA reviews state grants of variances and exemptions within an 18-month period and at least one such review must be undertaken in each 3-year period. If the USEPA determines that the state has abused its discretion in this area, the state must be notified and informed of the basis for the determination. A public hearing is scheduled by the USEPA unless the state takes adequate corrective action on the issue. If compliance is not demonstrated within a reasonable time, the USEPA is empowered to commence a civil action.

National Environmental Policy Act of 1969. The National Environmental Policy Act of 1969 (NEPA) declares it to be a national policy to "create and maintain conditions under which man and nature can exist in productive harmony." Under NEPA, Federal agencies are required, through an interdisciplinary approach, to fully evaluate the impact of proposed major Federal projects on the environment, including an analysis of alternatives and their associated environmental costs. This evaluation is compiled in a detailed environmental impact statement (EIS). Such an EIS must be prepared whenever a major Federal action will have a significant impact on the human environment. Prior to the preparation of an EIS, most agencies prepare an abbreviated environmental assessment (EA) to determine whether or not the activity will have a significant impact on the environment. If so, a detailed EIS is then prepared. If not, a Finding of No Significant Impact (FONSI) is made.

The impact of NEPA on a water utility depends on the extent of Federal involvement in a development project. Typically, the greatest interaction with NEPA will be in those cases where a surface water source is to be developed with Federal assistance. It is possible that an EIS or EA will have to be prepared by the Federal agency with the most "control" over the project. Factors that are important in determining the necessity for preparing an EIS include the following:

a. The amount of federal funds utilized for a project.

b. The extent to which one or more Federal agencies has control over the project.

c. The nature and extent of the potential adverse affect on the environment.

d. The lead agency's guidelines, as found in the Code of Federal Regulations for preparation of an EIS.

The need for preparation of an EA or EIS is extremely project-specific. However, the possibility of this requirement and the time needed for the completion of the EA and/or EIS should be considered and investigated as the planning process for a project progresses.

River and Harbor Act of 1899. In those cases where surface waters are to be developed as the source of water supply, it is possible that the River and Harbor Act will impact on the water utility. If a water intake structure or other structure is installed such that it creates a potential hazard to navigation, a Section 10 permit under the Act will have to be applied for. Such a permit must be obtained from the U.S. Army Corps of Engineers (CE) prior to construction. Those utilities relying primarily on groundwater will not be impacted by the Act.

Under CE regulations, a permit is required even if the structure is built outside the navigable portion of the channel if the structure affects the course, location, or condition of the watercourse in such a manner as to impact on the navigable capacity of the waterway. At least one Federal court has applied this provision to the taking of water from a river to a pumping plant for distribution to other areas of a state, when such diversion lowered the water levels and decreased water velocity downstream (Jarman, Sage, and Hooper 1983).

Application for a Section 10 permit must be made to the CE District in which the construction is to be performed. Table 7 lists the appropriate CE Districts within the study area.

Generally, the Section 10 application must include the following information:

a. A complete description of the proposed activity.

b. The location, purpose, and intended use of the proposed activity.

c. The scheduling of the activity.

d. The names and addresses of adjoining property owners.

e. The location and dimension of adjacent structures.

Table 7

Engineer District Service Areas by County

Engineer District and Address	Counties in Alabama	Counties in Kentucky	Counties in Mississippi	Counties in Tennessee
U.S. Army Engineer District, Memphis B-314 Clifford Davis Federal Building Memphis, TN 38103 (901) 521-3221	-----	-----	Alcorn, Prentiss	Henry, McNairy
U.S. Army Engineer District, Mobile P.O. Box 2288 109 St. Joseph Street Mobile, AL 36628 (205) 690-2511	Baldwin, Bibb, Choctaw, Clarke, Fayette, Greene, Hale, Jefferson, Lamar, Marengo, Marion, Mobile, Pickens, Sumter, Tuscaloosa, Washington	-----	Chickasaw, Clay, Itawamba, Kemper, Lauderdale, Lee, Lowndes, Monroe Noxubee, Oktibbeha, Pontotoc, Prentiss	----- -----
U.S. Army Engineer District, Nashville P.O. Box 1070 Estes Kefauver Federal Building 801 Broadway Nashville, TN 37202 (615) 251-5626	Colbert, Franklin, Lauderdale, Marion	Calloway, Christian, Livingston, Lyon, Marshall, McCracken, Trigg	Alcorn, Prentiss Tishomingo	Benton, Decatur Hardin, Henry, Houston, Humphreys, McNairy, Perry, Stewart, Wayne
U.S. Army Engineer District, Louisville P.O. Box 59 600 Federal Place Louisville, KY 40201 (502) 582-5601	-----	Caldwell, Christian, Livingston, McCracken	-----	-----

f. The approvals required by other Federal, interstate, state, or local agencies for the work, including all approvals received or denials already made.

g. Additional information that may be requested by the District Engineer.

An application fee of $10 is charged when the project is commercial or industrial in nature and is in support of operations that charge for the production, distribution, or sale of services.

After all the required information has been received by the CE, public notice is issued. The District Engineer is required to consider all public comments received in response to such notice. Receipt of all comments must be acknowledged and made a part of the official file on the application. The District Engineer must prepare an EA on all applications. In those cases where an EIS is required, a draft EIS serves as the EA. If requested in writing and deemed necessary, a public hearing may be held on the permit.

After considering all the information received, the District Engineer prepares "Findings of Facts" which include the probable effect the proposed work will have on the public interest. If such findings indicate a permit is warranted, the District Engineer determines the condition and duration of the permit and notifies the applicant by sending two copies of the draft permit. The permit becomes valid when both copies are signed and returned to the issuing official, who then signs and dates the permit. If the permit is denied, the applicant is notified in writing of the reason for denial.

Although the requirement for a River and Harbor Act Section 10 permit will vary from project to project, the time and resource requirements necessary to obtain such a permit may be substantial. The possibility of this requirement and the time and resources needed for its completion should be considered and investigated as the project planning process proceeds.

Tennessee Valley Authority Act. In addition to the Section 10 permit required by the River and Harbor Act, those utilities located within the Tennessee Valley (Tennessee River and tributaries) are regulated as to their right to build structures and/or withdraw water by the Tennessee Valley Authority (TVA). Section 26A of TVAs enabling act requires that TVA review and approve all structures proposed to be built in navigable waters of the Valley. A joint CE-TVA permit application may be filed. Approval from the TVA is also necessary to effect a withdrawal of water from the Tennessee River or its tributaries. The TVA review is primarily an analysis of prospective power

losses resulting from the withdrawal. Where power loss is demonstrated, the utility may be charged for the withdrawal.

Initial contacts with the TVA concerning its regulatory functions should be made through the field office located at the following address:

Tennessee Valley Authority
170 Office Service Warehouse Annex
Muscle Shoals, AL 35660
(205) 386-2221

Clean Water Act. The Clean Water Act and implementing regulations may impact a water utility in one of two ways. First, Section 402 may require a water utility to apply for a National Pollutant Discharge Elimination System (NPDES) permit. Second, activities of a water utility may require a Dredge and Fill Permit under Section 404 of the Act.

An NPDES permit is required for those water utilities that may have a pollutant discharge to a receiving stream. Such discharges may include wastewaters generated at remote facilities or waste sludges generated in water treatment processes. Although the Clean Water Act is a Federal law, administration of the Act and associated regulations has been delegated to the states. State agencies administering the Clean Water Act include the following:

a. Alabama Department of Environmental Management
Municipal Waste Control Section, Water Division
State Capitol
Montgomery, AL 36130
(205) 277-3630

b. Kentucky Department of Environmental Protection
Division of Water, Permits Branch
18 Reilly Road
Frankfort, KY 40601
(502) 564-3410

c. Mississippi Bureau of Pollution Control
Southport Mall
P. O. Box 10385
Jackson, MS 39204
(601) 961-5171

d. Tennessee Department of Health and Environmental Management
150 9th Avenue, North
TERRA Building
Nashville, TN 37203
(615) 741-7883

Section 404 of the Clean Water Act requires a permit for the discharge of

dredge or fill material into navigable waters. Typically, a water utility would require a Section 404 permit when undertaking development of a surface water source. Of primary interest to the water utility is the requirement for obtaining a permit to discharge fill material. The term "fill material" as applied to the requirement for a Section 404 permit includes the following activities in waters of the United States: placement of fill that is necessary for the construction of any structure; the building of any structure or impoundment requiring rock, sand, dirt, or other materials for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; dams and dikes, artificial islands, property protection and/or reclamation devices such as riprap, groins, seawalls, breakwaters, and revetments; beach nourishment; levees; fill for structures such as sewage treatment facilities and intake and outfall pipes associated with power plants and subaqueous utility lines; and artificial reefs.

Section 404 of the Clean Water Act is administered by the Corps of Engineers. Application for a Section 404 permit is made to the CE District in which the construction is to be performed. Table 7 lists the appropriate CE Districts for the study area.

State regulation

Alabama. The Alabama Department of Environmental Management (ADEM) is the state agency assigned the responsibility for administering the Alabama Safe Drinking Water Act of 1977 (ASDWA). The agency has obtained primacy from the USEPA and as a result fully administers the requirements of the Federal Safe Drinking Water Act. The USEPA has oversight responsibilities under the Federal Act. Contacts for assistance or information concerning the ASDWA should be addressed as follows:

Alabama Department of Environmental Management
Water Supply Program
c/o State Capitol
Montgomery, AL 36130
(205) 832-3170

The ADEM has published Regulations Governing Public Water Supplies (Alabama Department of Environmental Management 1982) which are defined as those systems for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves an

average of at least 25 individuals at least 60 days out of the year. A public water system includes any collection, treatment, storage, and distribution facilities under the control of the operator of such system and used primarily in connection with such system, and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. The administration of the ASDWA is accomplished through an operation and maintenance monitoring program and a capital improvements review program.

The operation and maintenance monitoring program includes the establishment of primary and secondary drinking water regulations. These regulations are primarily designed to control the quality of drinking water delivered to the consumer through the establishment of maximum allowable contaminant levels and the requirement for periodic water quality reporting.

The capital improvements review program includes the provision for review and approval of preliminary plans, plans and specifications, and the final construction. The regulations state that no person is allowed to enter into a financial commitment for or commence construction of a new public water system, a major modification of an existing public water system, or increase the capacity of an existing public water system prior to filing with the ADEM a preliminary report concerning the proposed construction and obtaining the necessary permit.

The ADEM reviews plans and specifications and issues a Permit to Construct. The following requirements pertain to all waterworks projects involving the construction of either entirely new systems or additions, significant improvements, or major modifications to existing systems:

a. An engineer's report must be submitted for review prior to the preparation of final plans and specifications.

b. Final plans and specifications must be reviewed and found acceptable before a Permit to Construct can be issued.

c. Prior to advertising for bids and/or executing contracts, final plans and specifications must be approved and a Permit to Construct issued.

d. All reports, final plans, and specifications must be submitted at least 30 days prior to the date on which action is required.

e. All work involved with the design of new public water systems or significant improvements or major modifications to existing public water systems must be performed by an engineer licensed by the Alabama State Board of Registration for Professional Engineers and Land Surveyors.

The ADEM regulations provide detailed instructions as to the required contents of engineer reports, plans, and specifications.

Upon completion of construction, the ADEM conducts a final inspection. If the project is constructed in accordance with the approved plans and specifications, the ADEM issues a temporary Permit to Use. Following receipt of as-built plans and specifications, a permanent Permit to Use is issued.

In addition to its regulatory function, the ADEM also performs a technical assistance role and can provide technical advice to water utilities. Such advice may include water source location, construction standards, and operational guidance. A particularly important role is the review of proposals for the formation of new water utilities. In many cases, recommendations are made to expand or consolidate existing utilities rather than form a new utility.

The Alabama Public Service Commission regulates private, for-profit water utilities. Municipalities and other public body water utilities as well as nonprofit associations providing water utility service are exempted from regulation of the Public Service Commission. In the case of private for-profit companies, the Commission regulates both rates and service area. The prospective water utility must file for a certificate of public convenience prior to implementation of service. Inquiries to the Commission should be addressed as follows:

Alabama Public Service Commission
501 Dexter Avenue
P.O. Box 991
Montgomery, AL 36102
(205) 832-6924

Kentucky. An existing or proposed water utility in the State of Kentucky will be regulated as to its right to withdraw water from a source, its service area and administrative operations including its rate structure, and its ability to meet public health and welfare requirements. Regulation of each of these areas of concern is accomplished by one of two state agencies. The Natural Resources and Environmental Protection Cabinet is charged with the administration of the Kentucky Water Resource Law (Kentucky Revised Statutes (KRS) 1982) and the Kentucky Public & Semipublic Water Supplies Regulations (Kentucky Administrative Regulation (KAR) 1983). The Kentucky Public Service Commission is charged with regulation of service areas and rates of public utilities including water utility systems (KRS 278.010 et seq.).

The Kentucky Water Resource Law (KRS 151.140) states that no person, business, industry, county, city, water district, or other political subdivision has the right to withdraw, divert, or transfer public water from a stream, lake, groundwater source, or other body of water until a permit is obtained. Withdrawals for agricultural, domestic, and electrical generation purposes are generally excepted from the permit requirement. Further, permits are not currently required for withdrawals less than 10,000 gal per day. The permit requirement includes both surface and groundwater withdrawals.

The procedure for obtaining the necessary withdrawal permit is initiated by making application with the following agency:

Natural Resources and Environmental Protection Cabinet
Division of Water, Permits Branch
18 Reilly Road
Frankfort, KY 40601
(502) 564-3410

Application forms are available from the regulatory agency. The applicant is requested to provide the following general information:

a. Applicant's name, address, and major products or services.

b. The requested withdrawal rates (average gallons per day by month) and location of any surface intake facilities or wells, raw water storage facilities, pumping plants, water treatment plants, wastewater discharge sites, and dams or reservoirs.

c. The location of the water return.

d. In the case of a public water supplier, additional information on the service area, number of people served, and distribution of water use.

e. Name and address of a contact person.

In addition to the initial requirement for a withdrawal permit, permit holders must report actual water withdrawals to the regulating agency. At present, special forms are sent to permit holders in January and July for reporting withdrawals for the previous 6 months.

Upon receipt of the application, the regulatory agency conducts an investigation if the quantity, time, place, or rate of withdrawal will be detrimental to the public interest or the rights of other public water users. If no detrimental effects are anticipated and the water is available, the agency will issue the permit. If required to serve the best interests of the public and other water users, a permit may be issued for an amount of water withdrawal less than that applied for. The withdrawal permit may be amended on

application of the withdrawer or unilaterally by the regulatory agency if the required reports indicate that the withdrawer is using a substantially different amount than permitted.

The issuance of a withdrawal permit represents only a limited right of use and does not vest ownership nor an absolute right to withdraw or use the water. Unlike appropriation rights states, there is no significance to the date of the permit as it relates to the priority of water withdrawal. During times of water shortage, drought, emergency, or similar situations, the regulatory agency may temporarily allocate the available supply of water among water users and restrict the water withdrawal rights of permit holders.

The Kentucky Water Resources Law (KRS 151, 140) states that no person, city, county, or other political subdivision of the state, including levee districts, drainage districts, flood control districts or systems, or similar bodies shall commence the construction, reconstruction, relocation, or improvement of any dam, embankment, levee, dike, bridge, fill, or other obstruction (except those constructed by the state highway department) across or along any stream, or in the floodway of any stream, unless the plans and specifications for such work have been submitted by the person or political subdivision responsible for construction, reconstruction, or improvement and such plans and specifications have been approved in writing by the regulatory agency and a permit issued. Presently, dams that are less than 25 ft in height and have an impounding capacity less than 50 acre-feet are exempt from permitting requirements. Appropriate forms for construction permits may be obtained from the Division of Water, Permits Branch, cited above.

The Natural Resources and Environmental Protection Cabinet is also responsible for regulating the health and welfare aspects of public and semipublic water supplies. This responsibility is carried out under the direction of the Drinking Water Branch of the Division of Water:

Natural Resources and Environmental Protection Cabinet
Division of Water, Drinking Water Branch
18 Reilly Road
Frankfort, KY 40601
(502) 564-3410

Although Kentucky does not have a Safe Drinking Water Act per se, the Cabinet has been directed by statute (KRS 1982) to promulgate regulations applicable to all public and semipublic water supply systems operating

in the Commonwealth of Kentucky. These regulations have been published as the Kentucky Public & Semipublic Water Supplies Regulations. The Commonwealth has accepted primary enforcement responsibility for the Federal Safe Drinking Water Act and as a result has agreed to adopt and enforce the provisions of that Act. The regulations promulgated by the state agency establish the standards and safeguards necessary and relative to the planning, operation, and maintenance of public and semipublic water supply systems for the protection of public health.

The primary functions of the Drinking Water Branch are monitoring the operation and maintenance activities of water utilities through collection of water quality data, conducting plant inspections, and reviewing and approving plans and specifications.

The regulations promulgated by the Division of Water contain detailed requirements for the operation of water treatment and distribution facilities. Operation and maintenance regulations include the following topics:

a. Maximum contaminant levels for inorganic chemicals, organic chemicals, bacteriological contamination, and physical properties.

b. Monitoring and analytical requirements.

c. Reporting, records, and notification procedures.

d. Administrative requirements such as obtaining variances and hearings, definition of terms, and design criteria.

Many of the operation and maintenance monitoring functions are conducted by a district office structure. The study area includes counties in two districts. Christian, Livingston, Lyon, and Trigg Counties are located in the Madisonville District Office area while Calloway, Marshall, and McCracken are located in the Paducah District Office area. Inquiries to the respective district offices can be made to the following addresses:

Madisonville District Office
Old TB Hospital
North Laffoon Street
Madisonville, KY 42421
(502) 821-4213

Paducah District Office
1390 Irvin Cobb Drive
Paducah, KY 42001
(502) 444-8298

In addition to the operation and maintenance monitoring functions, the Drinking Water Branch also reviews and approves plans and specifications for water utility capital improvement projects. When any supplier or potential supplier of water plans to undertake the construction of a new water treatment

plant or expand an existing one in any way, preliminary plans must be submitted before any financial commitment is made or any construction initiated. The term "preliminary plans" is applied to those items normally associated with an engineering feasibility study or preliminary engineering report. After review, the preliminary plans will be either approved or returned to the supplier for revision. The facility must be designed in accordance with the approved preliminary plans. Any change in the final design from the concept set forth in the preliminary plans must be approved by the regulatory agency prior to its incorporation in the final plans and specifications. Preliminary plans are not required for semipublic treatment facilities or for distribution system construction, extensions, or improvements.

The construction or installation of any new facilities or works or the alteration or reconstruction of any facilities or works in any public or semipublic water supply must not be initiated until final plans and specifications have been reviewed and approved in writing by the regulatory agency. Plans and specifications for all public water supplies must be prepared and submitted by a professional engineer registered in the State of Kentucky. The regulatory agency establishes the appropriate form and content of the plans and specifications. Upon completion of construction, the person who presented the plans must certify in writing that the project has been completed in accordance with the approved plans and specifications.

The Drinking Water Branch, in addition to its regulatory function, provides technical assistance to all persons (operators, engineers, local officials, private citizens) interested in the implementation of a water utility project. Technical assistance is provided without cost. The Drinking Water Branch is a significant repository of information on the technical aspects of water utility information.

The Public Service Commission of the State of Kentucky is charged with the responsibility for regulating utility rates and services so as to ensure that consumers receive reasonably adequate services at fair and reasonable rates while providing a fair return to the utility. The term "utility" means any person except a city who owns, controls, operates, or manages an energy utility or nonenergy utility. A water utility is classified as a nonenergy utility which includes any person except a city who owns, controls, operates, or manages any facility used or to be used for or in connection with the diverting, developing, pumping, impounding, distributing, or furnishing of

water to or for the public for compensation. Municipalities are excluded from the jurisdiction of the utilities regulatory commission. Water associations, water districts, combined water and sewer districts, and water commissions are specifically included within the jurisdiction of the utilities regulatory commission (KRS 1982).

A prospective water utility must obtain a certificate that the public convenience and necessity require the formation of such utility. The certificate defines the authorized service area of the proposed water utility. In the case of water districts and nonprofit associations, a certificate of public convenience and necessity must be obtained from the utilities regulatory commission prior to making application for formation of the district or incorporation of the association. A committee of not less than five resident freeholders of the geographical area sought to be served by the district or association must make application to the utilities regulatory commission. The commission must hold a public hearing and make a finding and determination of fact that the geographical area sought by the proposed water district cannot be feasibly served by any existing water supplier whether publicly or privately owned. If it is determined that the area sought to be served by the proposed water district can be served more feasibly by any other water supplier, the application must be denied.

In addition to controlling a utility's service area, the rate structures of utilities is also controlled by the utilities regulatory commission. Notice of rate changes must be given to the utilities regulatory commission 20 days prior to implementation of any rate change.

The commission is authorized to prescribe rules for the performance of any service or the furnishing of any commodity of the character furnished or supplied by the utility. On proper demand and tender of rates, the utility must furnish the commodity or render the service within the time and upon the conditions provided in the rules. General rules which apply to water utilities have been promulgated.

Inquiries concerning the interactions between a water utility and the utilities regulatory commission should be made to the following address:

Public Protection and Regulation Cabinet
Public Service Commission
730 Schenkel Lane
P.O. Box 615
Frankfort, KY 40602
(502) 564-3940

Mississippi. An existing or proposed water utility in the State of Mississippi will be regulated as to its right to a water source, its service area and administrative operations, and its ability to meet public health and welfare requirements. Regulation of each of these areas of concern is accomplished by one of three state agencies.

The Commission on Natural Resources (Commission), working through the Bureau of Land and Water Resources (Bureau) located in the Mississippi Department of Natural Resources (DNR), has the ultimate responsibility for conserving and managing the surface water and groundwater resources of Mississippi. The Commission's task in this respect is twofold. First, it assists waterway, riverbasin, and watershed authorities throughout the state in the performance of their duties as well as coordinates activities between the different districts. Second, and of primary importance to a water utility, the Commission determines and establishes the rights of all water users. The manner in which a water utility obtains a water right depends on the nature of the water source, i.e. surface water or groundwater.

Other than landowners withdrawing water for customary domestic purposes, most surface water appropriators wishing to perfect their rights must apply to the Commission for an adjudication of their request for an appropriative right. A landowner may utilize water from a spring arising on his land as long as the rights of water users downstream are not adversely affected. Although not required, such users may elect to perfect their rights to use of the spring under the procedures provided for all other surface water users.

The procedure for perfecting water rights is initiated by making application with the following agency:

Mississippi Department of Natural Resources
Bureau of Land and Water Resources
P.O. Box 10631
Jackson, MS 39209
(601) 961-5200

Priority among permittees is based upon the date that such application is received. The applicant must provide the following information:

a. Applicant's name and address.

b. The source of water desired to be appropriated.

c. The amount of water sought.

d. The location of the proposed works for diversion and use.

e. Estimated time for completion of the project.

f. Estimated time for the first actual application of the water for the use proposed.

g. The population and estimated future needs.

h. Any additional information which the Bureau may find appropriate.

If appropriate, a permit for withdrawal is issued. Limitations upon the original application may be imposed in furtherance of the public interest. The Bureau's authority to permit appropriation of water in any stream or lake is limited by the requirement of maintaining an average minimum flow in any stream or an average minimum lake level. Exceptions can be made for domestic and municipal users where adequate assurances are given that the water will later be returned in substantially the same amount.

Any person who desires to construct, enlarge, repair, or alter a dam or reservoir or any water course in Mississippi must file an application with and obtain written authorization from the Commission. The Commission is authorized to require the submission of plans and specifications prior to approval. In order to also acquire an appropriative right to store or use water from a reservoir, separate application for an appropriative right must be made. The Commission can place conditions on the building and maintenance of dams and reservoirs and conducts periodic safety inspections to ensure that requirements are being complied with.

Although groundwater supplies a significant majority of the water utilities in Mississippi (only three communities use surface water supplies, i.e. Jackson, Meridian, Columbus), groundwater in Mississippi is essentially an unregulated resource. The only current regulation of the groundwater resource relates to the licensing of water well drillers and the requirement that the driller file a report with the Commission containing information on the well within 30 days of completion.

In cases where the Commission finds that the use of groundwater in an area requires coordination and limited regulation for the protection of the

interest and rights of residents and property owners or is in the public interest, the Commission can declare and delineate a "capacity use area." A capacity use area is one where the board finds that the aggregate uses of groundwater in or affecting such areas have developed or threatened to develop to a degree which requires coordination and regulation or exceed or threaten to exceed or otherwise threaten or impair, the renewal or replenishment of such waters or any part of them.

Following the declaration of a capacity use area, regulations such as the Commission may find appropriate concerning the regulation of groundwaters will be promulgated. Such regulations may include the following:

a. Provisions requiring water users within the area to submit reports not more frequently than at intervals of 30 days concerning quantity of water used or withdrawn.

b. Provisions concerning the timing of withdrawals; provisions to protect against or abate saltwater encroachment; provisions to protect against or abate unreasonable adverse effects on other water users in the area.

c. Provisions concerning well depth and spacing controls and provisions establishing a range of prescribed pumping levels (elevations below which water may not be pumped) or maximum pumping rates, or both, in wells or for the aquifer or for any part thereof based on actual proof of the capacities and characteristics of the aquifer.

Upon declaration of a capacity use area, persons wishing to withdraw groundwaters in excess of 50,000 gal per day must obtain a permit from the Commission. Various administrative exceptions include wells constructed by an individual for domestic purposes, wells used for agricultural purposes, and activities associated with exploration and production of oil and natural gas. These exceptions, however, may be discontinued in the event of an affirmative finding that the public health, welfare, and safety will be endangered. To date (August 1983), no capacity use area has been declared although Lee County in the study area is a potential candidate as a capacity use area.

The Public Service Commission (PSC) of the State of Mississippi is vested with the authority to regulate utility rates and services so as to ensure reasonably adequate services at fair and reasonable rates to the consumer while providing a fair return to the utility. A public utility as defined by the PSC enabling legislation includes persons and corporations, or their lessees, trustees, and receivers now or hereafter owning or operating in this state equipment or facilities for the transmission, distribution, sale, or resale of water to the public for compensation. Regulations occur in two major areas.

First, the PSC regulates the service area of the individual public utility, and, second, the PSC regulates the rates charged by a public utility.

Several important exceptions to the PSC regulatory authority relate to the water utility industry. First, a public utility owned or operated by a municipality is not subject to the regulation of the PSC except as to the extension of utility service greater than 1 mile outside its corporate boundaries. Second, rates for the sale of water by a municipality, nonprofit corporations, or districts organized under Section 19-5-151 (Mississippi Code Annotated 1972) are not regulated. It should be noted, however, that a certificate of public convenience and necessity is required by these entities.

In summary, the PSC fully regulates privately held for-profit public utilities. Public utilities with other forms of ownership are only partially regulated. Assistance related to public utility regulation as it applies to a specific project may be obtained from the PSC at the following address:

Mississippi Public Service Commission
P.O. Box 1174
Sillers Office Building
Jackson, MS 39205
(601) 961-5400

The Mississippi State Department of Health is the state agency assigned the responsibility for administering the Mississippi Safe Drinking Water Law of 1976 (MSDWL). The agency has obtained primacy from the USEPA and as a result fully administers the SDWA. The USEPA retains oversight under the provisions of the Federal SDWA. Contacts for assistance or information concerning the MSDWL may be addressed as follows:

Mississippi State Department of Health
Division of Water Supply
P.O. Box 1700
Jackson, MS 39205
(601) 354-6616

The primary functions of the Division of Water Supply (DWS) are monitoring the operation and maintenance of water utilities through collection of water quality data and review of plans and specifications. Detailed criteria for the operation and maintenance standards are published by the DWS. These regulations include major sections on the following topics:

a. Maximum contaminant levels.

b. Monitoring and analytical requirements.

c. Reporting, records, and notification.

In addition to the water utility monitoring function, the DWS also has preconstruction and construction monitoring functions. Before a utility can initiate construction of a new public water system or increase the capacity of an existing public water system, the utility is required to submit sufficient information to the DWS for evaluation and approval. In effect, the DWS has the responsibility for technical review or approvals of planning, feasibility, and preliminary engineering studies related to water utility project implementation.

Prior to initiating construction of a new public water system or making significant extensions or alterations to an existing public water system which may affect operation of that system, plans and specifications for the proposed construction must be reviewed and approved by the DWS. Plans and specifications must be prepared by a professional engineer registered in the State of Mississippi.

The DWS will provide technical assistance to all persons (engineers, operators, local officials, private citizens) interested in the development and implementation of a water utility project. Technical assistance is provided without cost. The DWS is a significant repository of information on the technical aspects of water utility project implementation.

Tennessee. An existing or proposed water utility in the State of Tennessee may be regulated as to its service area and administrative operations, including rate setting, and its ability to meet public health and welfare requirements. Regulation of each of these areas of concern is accomplished by one of two state agencies.

Public utilities in the State of Tennessee are regulated by the Tennessee Public Service Commission. The term "public utility" as it relates to a water utility is defined to include every individual, copartnership, association, corporation, or joint stock company, their lessees, trustees, or receivers appointed by any court that own, operate, manage, or control any water system, plant, or equipment affected by and dedicated to the public use. There are several notable exceptions, however, that are significant to implementation of a water utility project. The following entities are specifically excluded from regulation and are known as nonutilities: any corporation owned by or any agency or instrumentality of the United States; any county, municipal

corporation, or other subdivision of the State of Tennessee; any corporation owned by or any agency or instrumentality of the state; any corporation or joint stock company more than 50 percent of the voting stock or shares of which is owned by the United States, the State of Tennessee, or by any nonutility referred to above; any cooperative organization association or corporation not organized or doing business for profit; and any of the foregoing utilities acting jointly or in combination or through a joint agency or instrumentality.

After examining the various exclusions, it is apparent that the authority of the Public Service Commission is essentially limited to the regulation of for-profit, privately held companies providing water utility service. Provisions are available in special cases for customers of a water utility district to seek a rate review from the Public Service Commission upon a written petition of 10 percent of the utility district's customers. Various exclusions, however, make this remedy somewhat suspect and its applicability must be assessed for specific cases.

Specific information concerning the role of the Tennessee Public Service Commission can be obtained by writing the following address:

Tennessee Public Service Commission
ATTN: Bob Davis
Cordell Hull Building
Nashville, TN 37219
(615) 741-2904

The Tennessee Water Quality Control Board is the state agency assigned the responsibility for administering the Tennessee Safe Drinking Water Act of 1983 (TSDWA). The agency has obtained primacy from the USEPA and as a result fully administers the SDWA. The USEPA retains oversight authority under the provisions of the Federal SDWA. Contacts for assistance or information concerning the provision or requirements of the TSDWA may be addressed as follows:

Tennessee Department of Public Health and Environment
Division of Water Quality Control
TERRA Building
Ninth Avenue North
Nashville, TN 37219
(615) 741-7206

The Division of Water Quality Control of the Tennessee Department of Public Health and Environment is responsible for the supervision of public

water systems. As a result, the Department is vested with the authority to regulate all phases of a public water system's operation which may affect the public health. Rules and regulations are published by the Department that cover the following areas of operation (Tennessee Department of Public Health and Environment 1983):

a. Supervision of design and construction.
b. Establishment of maximum contaminant levels for drinking water.
c. Monitoring and sampling requirements.
d. Certification of laboratories.
e. Facility citing requirements.
f. Operation and maintenance requirements.
g. Customer notification.
h. Records maintenance requirements.
i. Administrative procedures.

All public water systems are required to comply with all laws, rules and regulations, and policies of the Department. Any person operating a public water system other than a municipality, any agency or instrumentality of the United States, and any facility owned and operated by the State of Tennessee, or any organization otherwise exempt by law must have a charter or appropriate authorization lawfully issued as set forth in one or more of the following statutes:

a. Utility District.
b. General Corporation Act.
c. Tennessee Public Service Commission.
d. Urban Type Facilities.

Plan documents including reports, proposals, preliminary plans, survey and basic design data, general and detailed construction plans, profiles, specifications, and all other information pertaining to public water system planning must be submitted to the Department for review and approval. Plan documents for public water systems must be prepared by a person registered to practice engineering in the State of Tennessee.

Insofar as feasible, public water systems are required to be connected with a municipal, county, regional, or other existing approved water system capable of supplying the demand. Where such a connection is not feasible, other approved sources may be considered. Each public water system must be designed in such a manner as to facilitate the future connection of the system

to an expanding municipal, county, or regional system. Each public water system must be designed to provide service to all service areas anticipated or projected by the owner.

The Department controls siting of water utility source development facilities. Before a utility can enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, the utility must notify the Department and obtain approval.

"Design Criteria for Public Water" (Tennessee Department of Public Health and Environment 1983) was published as a guide in the preparation of reports and plans and specifications for public water supply systems. The guide attempts to establish a uniform system of design to protect the public health and expedite review of planning documents by the Department.

Technical Assistance Sources

A variety of governmental and quasigovernmental agencies may be called on to provide assistance to prospective and existing water utilities. The form of available assistance can be categorized as either direct financial aid via grants and/or loans or technical assistance. For the purpose of this study, technical assistance includes the furnishing of data and information and construction activities that may be accomplished as a part of the agencies' ongoing missions. Establishing and maintaining appropriate interfaces with these various agencies can enable the water utility to take advantage of significant levels of expertise in the planning, design, operation, and financing of water utility projects.

Sources of direct financial assistance are discussed in Part IV. This section discusses those agencies that are primarily limited to technical assistance programs, although in some cases direct financial assistance may be available.

Corps of Engineers

The Corps may undertake investigations of water and related land resources plans under specific authorizations by Congress or, for smaller studies, under general continuing authorities. Section 22 of Public Law 93-251 establishes a program of cooperative assistance to states in the preparation of comprehensive plans for development, utilization, and conservation of

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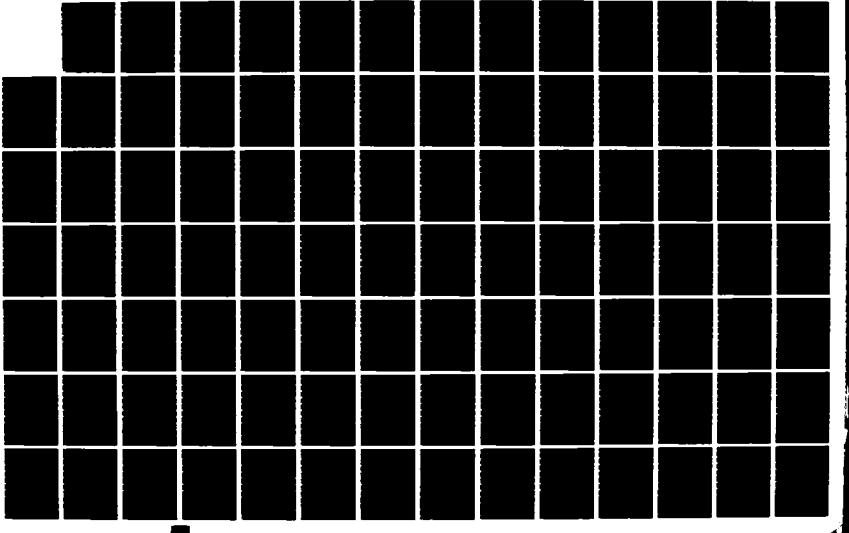
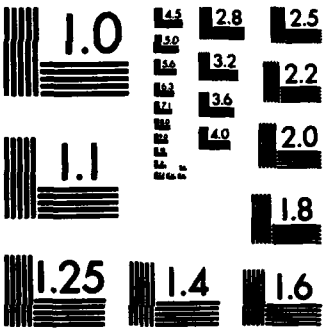




the water and related sources of drainage basins located within the boundaries of the state and to submit to Congress reports and recommendations with respect to appropriate Federal participation in carrying out the plan (OCE 1981).

The Corps also accomplishes special investigations in the report program which involve special considerations and may not be confined to natural river basins. They are carried out by the Corps with the cooperation, as necessary, of other Federal agencies and the states concerned. Examples are the Northeastern United States Water Supply Study and the Tennessee-Tombigbee Corridor Study.

Municipal and industrial water supply is considered the prime responsibility of municipalities or other non-Federal entities. However, municipal and industrial water supply storage may be recommended for inclusion in any Corps reservoir. If such storage is economically justified and represents the least cost alternative, it may be added to any project at any time. However, modification of existing projects for this purpose which would seriously affect the project, its other purposes, or its operations, requires congressional authorization.

No general authority exists to construct or finance construction of conveyance systems for water supply only. In exceptional cases, where the conveyance systems would be multipurpose, e.g., for water supply and water quality, the Corps has proposed and been authorized to construct such facilities and also to permit repayment in accordance with the provisions for repayment of water supply storage costs. If in the course of investigating multipurpose projects to include storage for water supply, should the investigation show that conveyance structures for use by non-Federal interests are necessary to the existence of the project, the costs of those structures are determined and presented in reports. If Congress adopts the reports as law, the conveyance costs can be financed pursuant to the provisions of the Water Supply Act.

Detailed information concerning the types of assistance available from the Corps of Engineers can be obtained from the District Office having responsibility for the geographic area where the water utility is located. Table 7 provides a listing of District Offices and the counties within the study area that they serve.

Tennessee Valley Authority

The TVA can provide technical assistance and in very special cases may be

able to provide limited financial assistance to water utilities located within the TVA power service area. Counties in the study area, listed in Table 8, are within the TVA power service area and thus eligible for assistance from TVA.

Table 8

Study Area Counties Within the TVA Power Service Area

State	Counties
Alabama	Colbert, Franklin, Lauderdale, Marion
Kentucky	Caldwell, Calloway, Christian, Livingston, Lyon, Marshall, McCracken, Trigg
Mississippi	Alcorn, Chickasaw, Clay, Itawamba, Kemper,* Lee, Lowndes, Monroe, Noxubee,* Oktibbeha, Pontotoc, Prentiss, Tishomingo
Tennessee	Benton, Decatur, Hardin, Henry, Houston,* Humphreys, McNairy, Perry, Stewart,* Wayne

* Qualify for the Special Opportunities Counties and Cities Program.

The primary form of assistance available from TVA is the conduct of planning studies for water supply development. Typical studies conducted by the TVA are county-wide and multicommunity water supply studies. These generally broad planning studies identify alternatives and make recommendations but development of detailed engineering, institutional, and financial arrangements remain the responsibility of the local entity. The TVA can fund studies of this nature.

A popular form of assistance available from TVA is the Leak Detection Program managed by the Office of Natural Resources and Economic Development. Under this program, the TVA loans equipment to local water utilities for conduct of leak detection surveys. In addition to equipment, TVA provides initial training in use of the equipment. The TVA has assisted over 150 communities under this program. It is estimated that the program is saving 145 million gal a month in treated water that would otherwise have been lost.

The TVA is not authorized to construct single-purpose reservoirs for municipal and industrial water supply. However, municipal and industrial water supply can be included in a multipurpose reservoir constructed by TVA.

In addition, the TVA could participate in funding a multipurpose reservoir not owned by TVA. For example, TVA could fund the flood control portion while a local entity funded the water supply portion of a reservoir project.

The TVA sponsors a Special Opportunities Counties and Cities (SOCC) Program to assist less developed areas in the power service area. This program concentrates on efforts which can improve the economy of less developed areas and emphasizes projects which create jobs, enhance per capita income, and develop a community's capability to deal more effectively with its own problems. The program in itself is not a water supply program; however, in very special cases a water supply project could qualify for assistance from the SOCC Program. Counties within the study area which qualify for the SOCC Program include Kemper and Noxubee in Mississippi and Houston and Stewart in Tennessee.

Detailed requests for information concerning assistance programs available from the TVA should be addressed as follows:

Tennessee Valley Authority
Director of Air and Water Resources
141 Evans Building
Knoxville, TN 37902
(615) 632-6770

Soil Conservation Service

As an agency, the U. S. Department of Agriculture Soil Conservation Service (SCS) is primarily concerned with the preservation of soil and water resources. Typical SCS project purposes include soil-erosion control, flood control, and recreation enhancement. Although not commonly included, the SCS is authorized to include water supply storage in reservoirs constructed by the agency. This could be a valuable form of indirect financial aid for those locations within the study area that are facing near exhaustion of the groundwater supplies now predominantly used as a water source. Specific project proposals can be coordinated through the SCS field office structure.

Alabama. The SCS state office in Alabama may be contacted at the following address:

Soil Conservation Service
665 Opelika Road
Auburn, AL 36830
(205) 821-8070

The SCS field office structure for the study area in Alabama is presented in Table 9.

Kentucky. The SCS state office in Kentucky may be contacted at the following address:

Soil Conservation Service
333 Waller Avenue
Lexington, KY 40504
(606) 233-2749

The SCS field office structure for the study area in Kentucky is presented in Table 10.

Mississippi. The SCS state office in Mississippi can be contacted at the following address:

Soil Conservation Service
Suite 1321 Federal Building
100 West Capitol Street
Jackson, MS 39269
(601) 960-5205

The SCS field office structure for the study area in Mississippi is presented in Table 11.

Tennessee. The SCS state office in Tennessee can be contacted at the following address:

Soil Conservation Service
675 Estes Kefauver FB-USCH
801 Broadway
Nashville, TN 37203
(615) 251-5471

The SCS field office structure for the study area in Tennessee is presented in Table 12.

U.S. Geological Survey

The missions of the U.S. Geological Survey (USGS) are to collect, analyze, and disseminate information about the earth, its processes, and its water and mineral resources. As relates to water utility project implementation, the USGS has principal responsibility for appraising the source, quantity, quality, and movement of the Nation's water resources. The USGS is the lead agency for coordinating the activities of all Federal agencies in the acquisition of water data on streams, lakes, reservoirs, estuaries, and groundwaters. The

Table 9

SCS Field Office Structure for Alabama

County Served	Field Office	Address
Lauderdale	Florence Field Office	Courthouse Building, Room 7 202 South Court Street Florence, AL 35630 (205) 764-5332
Franklin	Russellville Field Office	Sibley Office Building 204 North Jackson Street Russellville, AL 35653 (205) 332-0274
Colbert	Colbert County Soil Survey Office	Colbert County Courthouse North Main Street Tuscumbia, AL 35674 (205) 383-4282
Tuscaloosa	Tuscaloosa Area Office	Federal Building, Room 208 1118 24th Avenue Tuscaloosa, AL 35401 (205) 759-4716
Jefferson	Vestavia Hills Field Office	Todd's Vestavia Mall 2037 Canyon Road Vestavia Hills, AL 35216 (205) 823-3889
Pickens	Carrollton Field Office	Service Center Building, Room 301 PO Box 232 Carrollton, AL 35447 (205) 367-8279
Greene	Eutaw Field Office	County Activities Building 406 Morrow Avenue Eutaw, AL 35462 (205) 372-4910
Fayette	Fayette Field Office	Courthouse Annex 103 First Avenue, N.W. PO Box 307 Fayette, AL 3555 (205) 932-5993

(Continued)

(Sheet 1 of 4)

Table 9 (Continued)

County Served	Field Office	Address
Hale	Greensboro Field Office	Town and Country Shopping Center 411 South Tuscaloosa Street Greensboro, AL 36744 (205) 624-3265
Hale	Alabama Fish Farming Center	High 69, North PO Box 487 Greensboro, AL 36744 (205) 624-3651
Marion	Hamilton Field Office	Riggs Building 121 First Avenue, S.W. PO Box E Hamilton, AL 35570 (205) 921-3841
Sumter	Livingston Field Office	Federal Building Washington, Madison, & Marshall Streets PO Box 250 Livingston, AL 35470 (205) 652-7521
Tuscaloosa	Tuscaloosa Field Office	613 Queen City Avenue Tuscaloosa, AL 35401 (205) 758-9522
Lamar	Vernon Field Office	Post Office Building 109 Columbus Avenue PO Box B Vernon, AL 35592 (205) 695-7425
Bibb	Centreville Field Office	Community Activities Building, Room 113 103 Davidson Drive Centreville, AL 35042
Sumter	Sumter County Soil Survey Office	Federal Building Washington, Madison, & Marshall Streets Livingston, AL 35470 (205) 652-7521

(Continued)

Table 9 (Continued)

County Served	Field Office	Address
Pickens	Pickens County Soil Survey Office	Old Jones Store Courthouse Square Carrollton, AL 35447 (205) 367-2122
Tuscaloosa	Tuscaloosa Watershed Office	Federal Building, Room 208 1118 24th Avenue Tuscaloosa, AL 35402 (205) 759-4716
Tuscaloosa	Tombigbee-Cawaco RC&D Office	Federal Building, Room 208 1118 24th Avenue Tuscaloosa, AL 35402 (205) 759-4716
Clarke	Grove Hill Area Office	Gilmore Building 127A Clarke Street Grove Hill, AL 36451 (205) 275-3185
Baldwin	Bay Minette Field Office	Courthouse Annex, Room 103 Bay Minette, AL 36507 (205) 937-7174
Baldwin	Foley Field Office	Foley Hotel Building 109 South Alston Street Foley, AL 36535 (205) 943-8361
Choctaw	Butler Field Office	117 South Mulberry Street Butler, AL 36904 (205) 459-2496
Washington	Chatom Field Office	Frank Turner Hall Building Chatom, AL 36518 (205) 847-2292
Clarke	Grove Hill Field Office	Courthouse Building, Room 211 Court Street Grove Hill, AL 36451 (205) 275-3757

(Continued)

Table 9 (Concluded)

County Served	Field Office	Address
Marengo	Linden Field Office	County Office Building, Room 212 101 North Shiloh Street Linden, AL 36748 (205) 295-5695
Mobile	Mobile Field Office	3038 Springhill Avenue Mobile, AL 36607 (205) 690-3104
Marengo	Marengo County Soil Survey Office	Courthouse Basement, Room 3-B 101 East Coats Avenue Linden, AL 36748 (205) 295-5854

(Sheet 4 of 4)

Table 10

SCS Field Office Structure for Kentucky

County Served	Field Office	Address
Caldwell	Princeton Field Office	Princeton Parkway Inn 112A Highway 62 W Princeton, KY 42445 (502) 365-5533
Calloway	Murray Field Office	Bel Air Shopping Center Murray, KY 42071 (502) 753-1781
Christian	Hopkinsville Field Office	Indian Hills Shopping Center 3137 Canton Street Hopkinsville, KY 42240 (502) 885-8688
Livingston	Smithland Field Office	McKinney Building US 60 East P.O. Box 185 Smithland, KY 42081 (502) 928-2149
Lyon	Eddyville Field Office	Dunn Building Dale Avenue Eddyville, KY 42038 (502) 388-7653
Marshall	Benton Field Office	204 East 13th Street Benton, KY 42025 (502) 529-3236
McCracken	Paducah Field Office	2933 Lone Oak Road Paducah, KY 42001 (502) 554-7264
Trigg	Cadiz Field Office	Post Office Building Main Street P.O. Box 448 Cadiz, KY 42211 (502) 522-3304

Table 11

SCS Field Office Structure for Mississippi

County Served	Field Office	Address
Alcorn	Corinth Field Office	2129 Highway 72 East Corinth, MS 38834 (601) 287-4460
Chickasaw	Houston Field Office	Trust Building P.O. Box 191 Houston, MS 38851 (601) 456-3086
Clay	West Point Field Office	612 West Main Street P.O. Box 237 West Point, MS 39773 (601) 494-4101
Itawamba	Fulton Field Office	Spencer Building 302 West Cedar Street P.O. Box 68 Fulton, MS 38843 (601) 862-9794
Kemper	DeKalb Field Office	Sorrels Building Eighth & Seventh Streets P.O. Box 576 DeKalb, MS 39328 (601) 743-5894
Lauderdale	Meridian Field Office	Executive Building 2412-Seventh Street Meridian, MS 39301 (601) 485-4313
Lee	Tupelo Field Office	Chism Building 1427 East Main Street P.O. Box 225 Tupelo, MS 38802 (601) 842-3971
Lowndes	Columbus Field Office	Weathers Building 1553 Second Avenue North P.O. Box 989 Columbus, MS 39701 (601) 328-4142
Monroe	Amory Field Office	Front Street City Hall P.O. Box 188 Amory, MS 38821 (601) 256-5045

(Continued)

Table 11 (Concluded)

County Served	Field Office	Address
Noxubee	Macon Field Office	Stennis Building West Street P.O. Box 389 Macon, MS 39341 (601) 726-4425
Oktibbeha	Starkville Field Office	The 300 Russell Street Office Building P.O. Box 824 Starkville, MS 39759 (601) 323-5273
Pontotoc	Pontotoc Field Office	Simon Building 12 West Reynolds Street P.O. Box 478 Pontotoc, MS 38863 (601) 489-6318
Prentiss	Booneville Field Office	North Miss. Savings & Loan Building Front Street P.O. Box 106 Booneville, MS 38829 (601) 728-3544
Tishomingo	Iuka Field Office	115 East Front Street P.O. Box 250 Iuka, MS 38852 (601) 423-6272

Table 12

SCS Field Office Structure for Tennessee

County Served	Field Office	Address
Benton	Camden Field Office	Camden Mutual Building, Hwy 641 North PO Box 211 Camden, TN 38320 (901) 584-8125
Henry	Paris Field Office	USDA Office Building 408 North Market Street Paris, TN 38242 (901) 642-0761
Decatur	Decaturville Field Office	Courthouse Building PO Box 267 Decaturville, TN 39329 (901) 852-3761
Hardin	Savannah Field Office	202 Post Office Building PO Box 426 Savannah, TN 38372 (901) 925-4246
McNairy	Selmer Field Office	Moore Building 175 South Third Street PO Box 159 Selmer, TN 38375 (901) 645-3666
Stewart	Dover Field Office	Watson Building, Suite 10 Spring Street PO Box 187 Dover, TN 37058 (615) 232-5949
Houston	Erin Field Office	Smith Office Building, Public Square PO Box 228 Erin, TN 37061 (615) 289-4864
Humphreys	Waverly Field Office	Building 125 Waverly Plaza Shopping Center PO Box 177 Waverly, TN 37185 (615) 296-3442

(Continued)

Table 12 (Concluded)

County Served	Field Office	Address
Perry	Linden Field Office	Courtview Office Building Main Street PO Box 61 Linden, TN 37096 (615) 589-2615
Wayne	Waynesboro Field Office	Second Floor, Helton Bldg. East Side of Public Square PO Box 463 Waynesboro, TN 38485

mission of the Water Resources Division is to provide the hydrologic information and understanding needed for the optimum utilization and management of the Nation's water resources. This is accomplished by the conduct of the following activities:

a. Collecting, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water sources.

b. Conducting analytical and interpretive water resource appraisals describing the occurrence, availability, and physical, chemical, and biological characteristics of surface and groundwater.

c. Conducting supportive basic and problem-oriented research in hydraulics, hydrology, and related fields of science to improve the scientific basis for investigations and measurement techniques and to understand hydrologic systems sufficiently well to quantitatively predict their response to stress, either natural or man-made.

d. Disseminating the water data and the results of investigations and research through reports, maps, computerized information services, and other forms of public releases.

e. Coordinating the activities of Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and groundwaters.

As a result, the USGS is a repository of significant amounts of water quality and quantity data that are necessary for source evaluation. These data are made available to the public as well as technical assistance in the evaluation of both groundwater and surface water supply sources.

Offices in each state can provide information on technical assistance available from the USGS. The respective state office addresses are as follows:

Alabama. The USGS in Alabama can be contacted at the following addresses:

U.S. Geological Survey
520 Nineteenth Avenue
Tuscaloosa, AL 35401
(205) 752-8104

U.S. Geological Survey
P.O. Box 17399
2721 Gunter Park Drive West
Montgomery, AL 36117
(205) 832-7510

Kentucky. The USGS in Kentucky can be contacted at the following addresses:

U.S. Geological Survey
P.O. Box 770
Paducah, KY 42001
(502) 443-1252

U.S. Geological Survey
Room 572 Federal Building
600 Federal Place
Louisville, KY 40202
(502) 582-5241

Mississippi. The USGS in Mississippi can be contacted at the following address:

U.S. Geological Survey
100 W. Capitol Street, Suite 710
Jackson, MS 39269
(601) 960-4600

Tennessee. The USGS in Tennessee can be contacted at the following address:

U.S. Geological Survey
Water Resources Division
A-413 Federal Building-U.S. Courthouse
Nashville, TN 37203
(615) 251-5424

Local development districts

The local development districts operating within the study area provide a variety of planning and technical assistance activities focusing on local and area-wide problems associated with water utility project implementation. These development districts identify potential problems, assist existing and prospective water utilities in determining sources of grants and loans for water projects, assist in the application process to secure these funds, and generally function as a coordinating agency for interaction with state and Federal programs. In this last role, the local development districts are adept in the development of multiagency funding programs that incorporate both grant and loan funds from an assortment of sources.

The local development districts are significant repositories of data concerning the institutional and financial implementation of water utility projects. In addition, they provide a source of information on the nature and character of local political and institutional forces that operate within their respective areas with respect to the public sector decisionmaking processes.

The level of service provided by each local development district may vary. Specific inquiries concerning possible assistance should be obtained from the development district serving the particular geographic area of interest. Tables 13-16 identify the local development districts and their respective service areas.

The Tennessee Department of Economic and Community Development (DECD) is another agency within the State of Tennessee that can provide assistance to

Table 13

Local Development Districts in Alabama

District	Counties Served
South Alabama Regional Planning Commission P.O. Box 1665 Mobile, AL 36601 (205) 433-6541	Baldwin, Mobile
Alabama-Tombigbee Regional Commission P.O. Box 269 Camden, AL 36726 (205) 682-4234	Choctaw, Clarke, Marengo, Sumter, Washington
West Alabama Planning and Development Council P.O. Drawer 408 Northport, AL 35476 (205) 345-5545	Bibb, Fayette, Greene, Hale, Lamar, Pickens, Tuscaloosa
Birmingham Regional Planning Commission Magnolia Office Park, Suite 220 2112 11th Avenue, South Birmingham, AL 35256 (205) 251-8139	Jefferson
Northwest Alabama Council of Local Governments P.O. Drawer 2603 Muscle Shoals, AL 35660 (205) 383-3861	Colbert, Franklin, Lauderdale, Marion

Table 14

Local Development Districts in Kentucky

District	Counties Served
Pennyrile Area Development District 609 Hammonds Plaza Hopkinsville, KY 42240 (502) 886-9484	Caldwell, Christian, Livingston, Lyon, Trigg
Purchase Area Development District P.O. Box 588 U.S. Highway 45N Mayfield, KY 42066 (502) 247-7171	Calloway, Marshall, McCracken

Table 15

Local Development Districts in Mississippi

District	Counties Served
East Central Planning and Development District P.O. Box 499 Newton, MS 39345 (601) 683-2007	Kemper, Lauderdale
Golden Triangle Planning and Development District P.O. Drawer DN State College, MS 39762 (601) 325-3855	Clay, Lowndes, Noxubee, Oktibbeha
Three Rivers Planning and Development District 99 Center Ridge Drive Pontotoc, MS 38863 (601) 489-2415	Chickasaw, Itawamba, Lee, Monroe, Pontotoc
Northeast Mississippi Planning and Development District P.O. Drawer 6-D Booneville, MS 38829 (601) 728-6248	Alcorn, Prentiss, Tishomingo

Table 16

Local Development Districts and Planning Assistance Offices in Tennessee

District	Counties Served
Southwest Tennessee Development District 416 East Lafayette Jackson, TN 38301 (901) 422-4041	Decatur, Hardin, McNairy
South Central Tennessee Development District P.O. Box 1346 Columbia, TN 38401 (615) 381-2041	Perry, Wayne
Mid-Cumberland Council of Governments Suite 600, 501 Union Street Nashville, TN 37219 (615) 244-1212	Houston, Humphreys, Stewart
Northwest Tennessee Development District P.O. Box 63 Martin, TN 38237 (901) 587-4213	Benton, Henry
Local Planning Assistance Office Jackson State Office Building Suite 302A Jackson, TN 38301 (901) 423-5650	Decatur, Hardin, McNairy, Benton, Henry
Local Planning Assistance Office 4751 Trousdale Drive Nashville, TN 37220 (615) 741-1534	Perry, Wayne, Houston, Humphreys, Stewart

existing or prospective water utilities. The local planning assistance offices can assist in coordinating utility planning for communities. This assistance is provided through the local planning assistance offices. The two offices serving the counties within the study area are presented in Table 16.

Water resources research institutes and centers

Each state within the study area operates a water resources research

institute or equivalent. These bodies administer cooperative Federal-state funded programs of problem-oriented research and training of scientists and engineers in fields related to water resources. These agencies can provide technical assistance and perform planning studies related to water resources development. In addition, these agencies may provide an extensive data base for information related to water resources in the state. The various institutes are listed in Table 17.

Table 17

Water Resource Research Institutes Within the Study Area

State	Agency and Address
Alabama	Water Resources Research Institute 202 Hargis Hall Auburn, AL 36849 (205) 826-5075
Kentucky	Water Resources Research Institute College of Engineering Lexington, KY 40506 (606) 257-1299
Mississippi	Water Resources Research Institute P.O. Drawer AD Mississippi State, MS 38762 (601) 325-3620
Tennessee	Water Resources Research Center 428 South Stadium University of Tennessee, TN 37996 (615) 974-2151

Other agencies

The U.S. Department of Health and Human Services (DHHS) sponsors various rural development and community action agencies that may provide technical assistance in the implementation of a water utility project. Typically, non-profit corporations, funded by grants from DHHS, provide technical effort designed to provide professional services to small, rural communities needing assistance in developing or maintaining safe, affordable drinking water supplies and sanitary waste disposal facilities. The activities of these development agencies are primarily oriented towards rural low income communities.

Technical services provided by these agencies may include one or more of the following:

a. Technical consultation on site assessment of water supply problems and exploration of alternative solutions.

b. Assistance in working with an engineer and on financial, legal, regulatory, and managerial aspects of system development.

c. Assistance in the operation and management of a water utility including rate structure analysis, billing and accounting, maintenance scheduling, and debt service problems.

d. Financial assistance to identify and apply for available loans and grants, including predevelopment and private financing alternatives.

e. Consultation on appropriate technology alternatives for communities where conventional approaches do not work or are too expensive.

Two development agencies provide service in the study area. The States of Alabama, Mississippi, and Tennessee are served by the following agency:

Community Resource Group, Inc.
2705 Chapman
Springdale, AR 72764
(501) 756-2900

The State of Kentucky is served by the following agency:

Great Lakes Rural Network, Inc.
c/o WSOS Community Action Commission, Inc.
P.O. Box 568
Fremont, OH 43420
(419) 334-8911

In Kentucky, there is also a subagency:

Kentucky Association for Community Action
41 Fountain Place
Frankfort, KY 40601
(502) 875-5863

Several other local and state agencies may have an impact on the development of water utility projects within the study area. Typical of these are the river basin development districts found in Mississippi. These districts have undertaken significant water-resource-related assignments and have been active in the assessment and development of water supply resources. Such river basin development districts within the study area include the Tombigbee River Valley Water Management District in Tupelo, Miss., and the Pat Harrison Waterway Commission in Hattiesburg, Miss.

In addition to the river basin development districts, several watershed associations are also active within the study area (ARC 1982). Generally, these watershed districts are primarily concerned with flood protection and erosion control; however, they may undertake broader responsibilities such as water supply. Examples of such organizations are the Bear Creek Watershed Association in Alabama and the Yellow Creek Watershed Authority in Mississippi.

PART IV: FINANCIAL IMPLEMENTATION

Background

Perhaps the most critical water utility management function is that of obtaining sufficient capital and operating funds. Regardless of the institutional structure, implementation of a water utility project is a capital-intensive enterprise. Funds must be generated in sufficient quantities for initial construction, capital improvements following initial system construction, and annual operating and maintenance. The requirement for large sums of capital as well as the complex and changing nature of the available financial alternatives create the need for investigating and evaluating all potential revenue sources as a prerequisite to developing a local funding package.

Publicly owned utilities usually finance capital improvements through the use of either cash financing or debt financing. The nature and magnitude of capital improvement to be financed generally determine the type of financing to be used. McKinley (1983) offers general guidelines for the selection of the appropriate type of financing. Cash financing should be utilized to finance items of a recurring nature, such as routine improvements or replacement of meters, hydrants, mains, and equipment from water sales revenue. Debt financing should be used for nonrecurring items including major additions such as new sources of supply, new treatment plants, major transmission or pumping facilities, or major rehabilitation programs. The use of debt financing for major system improvements more nearly matches the period of financing the costs to the expected service life of the improvement and as a result the cost burden is shared between existing and future users of the system.

To facilitate the discussion of financial implementation techniques, potential revenue sources can be grouped into three broad categories (Theiler et al. 1981):

a. Local sources of operating income.

b. Local sources of capital.

c. Intergovernmental sources of capital.

The revenue sources in each of these categories must be analyzed somewhat differently. For example, intergovernmental sources of revenue raise questions regarding eligibility, limitations on the use of funds, and application procedures. On the other hand, local funding sources raise questions

regarding institutional considerations such as the requirement for a referendum for a particular class of bond issue. Local sources of funds may also involve equity issues regarding who pays and who benefits.

The following discussion is intended to provide general guidance on the various funding sources and available funding mechanisms. Because each situation is unique, water utilities should seek assistance from their engineering, legal, and financial counsel on specific financing alternatives for proposed water utility projects. It must also be pointed out that the many Federal and state assistance programs described later in this section are subject to constant review and possible change by the respective legislative bodies.

Local Sources of Operating Income

The primary local sources of operating income include user fees and various other forms of taxation. Table 18 summarizes the different types of user charge and tax-based revenues that may be available to a publicly owned water utility (Theiler et al. 1981). Privately owned utilities are generally limited to the collection of user fees and charges.

The primary source of revenue for most utilities is through direct water sales. This is generally recognized as the most equitable means of distributing service costs among consumers because rates may be structured to account for fixed service, commodity, and ready-to-serve costs. Fixed charges include meter reading, billing, accounting, and other services that are not a function of use. A commodity charge is based on the amount of water actually used during a billing period. A ready-to-serve charge accounts for service costs that are associated with construction to meet water system needs, especially those required to meet peak demand requirements.

Many utilities structure water rates to reflect the different service needs and costs of the various customer classes. Residential users typically have a higher demand factor (ratio of peak to average use) than large industrial users. A high demand factor requires extra system capacity on a ready-to-serve basis; therefore, residential users are typically charged higher unit-volume rates in order to recover the associated costs. Ready-to-serve charges may also be levied on vacant lots where service is provided but unused. Other system costs may be specific to certain users and charged accordingly. Fire service is one example. All community residents benefit from public fire

Table 18

Local Operating Income Sources

	General Sales Tax	Selective Sales Tax	Use Tax	Ad Valorem Property Tax	General Occupation Tax	Specific Occupation Tax
Description privilege	Excise tax levied on retail sales of tangible personal property (sometimes services) and made inside the taxing jurisdiction.	Excise tax levied on retail sales of certain products inside taxing jurisdiction. Most common are tobacco, alcoholic beverages, motor fuel, public utilities, insurance, and pari-mutuels.	Tax on the privilege of storing, distributing, using, or consuming articles of tangible personal property in the taxing jurisdiction and on which no sales tax has been paid. It is generally complementary to sales tax.	Ad valorem tax computed on the assessed valuation of all property, real and personal, located within the territorial limits of the authority levying the tax.	Tax imposed for the of carrying on any of a broad range of occupations within the taxing jurisdiction.	Tax imposed for the privilege of carrying on certain occupations within a taxing jurisdiction. Utility occupation (franchise) taxes and beer and liquor occupation taxes are common.
Incidence	Regressive to income. Neutral to household size. Taxes nonresident visitors. Relief programs can reduce regressivity.	More regressive to income than general sales tax. Neutral to household size. Taxes nonresidents and visitors.	Same as general sales tax. Particularly hits purchasers of motor vehicles and construction and building materials.	Regressivity similar to general sales tax. Neutral to household size. Relief programs can reduce regressivity.	Where taxes are levied on firms doing business locally, same as general sales tax. Where tax is on exporting industry, it is exported outside of the region. A flat rate is regressive to individual income above any exemption level. Government employees exempt.	Same as general occupation tax.
Control	High degree of local control.	Where legal, local control is good.	Local use taxes are administered by local government. Good control.	Statutory mill levy limits may severely constrain local control.	Excellent local control.	Excellent local control.
Market side effects	Sets incentives for retail business location just outside of taxing jurisdiction.	Sets incentives for retail business location just outside of taxing jurisdiction.	Reduces incentives for retail business location just outside of taxing jurisdiction, especially with regard to autos and construction materials.	Disincentive to new market development.	Significant side-effects unlikely.	Heavy specific occupation taxes may discourage affected businesses from locating in the area and/or may result in price increases and negatively affect consumption.
Certainty/ predictability	Moderately good predictability in short run. Poor predictability over 3- to 5-year term.	Predictability depends on specific object of taxation. Good for motor fuels, tobacco products, and alcohol.	Same as general sales tax.	Good predictability of residential portion of tax base. Industrial and mining portions are more subject to erratic changes if production is unstable.	Very good predictability.	Very good predictability.
Administrative cost	Largest administrative cost due to vendor fee.	Somewhat higher than cost for general sales tax.	High. May approach 10% or more of revenue. Property tax is extremely small.	The cost of increasing or decreasing reliance on property tax is extremely small.	Depends on size of tax. At higher levels, the administration cost approximates general sales tax.	Depends on size of tax. At higher levels, approximates selective sales tax.
Citizen acceptance	Opinions vary with existing level. Has consistently topped property tax in popularity surveys. Fractions of 1% may be preferred at times.	Opinions vary with existing level. High level of taxation on tobacco and alcohol expected.	Strongly favored by local merchants selling major cost items located inside sales taxing jurisdiction.	Considered regressive and often unfairly administered. Frequently comes in last in popularity in research opinion polls.	May engender opposition as "new tax." Will have opposition from business community.	Citizens may feel they are being taxed at every turn. Businesses may argue that they are discriminated against.

(Continued)

Table 18 (Concluded)

	User Fees	Local Income Tax	Real Estate Transfer Tax	Site Value Tax	Land Value Increment Tax
Description privilege	Prices charged the consumers of various public services such as water and sewer charges or recreation program charges. Fees may include charge for capital facilities as well as operating costs.	Tax on the income of resident individuals, estates, and trusts and income of nonresidents derived from local sources. Also would apply to the incomes of corporations located in or doing business in the local area.	Tax levied on the conveyance of real property. The tax is analogous to a sales tax on real property.	Ad valorem tax on assessed valuation of land but not improvements. between two points in time.	Tax imposed on the net gain in the value of a given parcel of land or land with improvements
Incidence	Paid by the beneficiary of the service or facility. User fees ignore cigizens' *ability to pay. User fees* can ensure growth, pays its own way.	Graduated income taxes are strongly progressive with respect *to income. Corporate* income taxes are exported by export base industries. Income taxes bear lightly on elderly and low income people.	Conditions in real estate markets determine tax incidence. In a *soft, buyers market, the* seller will bear more tax burden than in a tight, sellers market.	Landowners of all types. Less burden on occupants of high *density residence.*	Landowners in areas experiencing rapid increases in land value.
Control	Excellent local control. Control as a revenue source is enhanced by the fact that increased costs due to increased demand are self-financing.	Local control may be limited by state law.	Tax rate is subject to control, but the tax base is influenced by nonlocal economic developments.	State mill levy limits can severely constrain local control.	Local control may be limited by state law.
Market side effects	Set incentives for the efficient use of public services since users pay for only the amount used. High initial fees for public facilities are reflected in higher housing costs.	Significant market side-effects not identified.	Creates incentives to avoid property sales. In a tight market, housing prices will rise to cover tax cost. In a soft market, housing prices will be less affected. Such efforts correlate to the tax rate applied.	Creates incentives to put land into its highest and best use allowed by law. Favors full development of area.	Reduces return to land speculation. Would inhibit exchange if applied to real rather than accrued gains. If applied to accrued gains, would provide incentive to put land into highest and best use.
Certainty/ predictability	At fixed rate levels, good predictability. However, rate variations can be expected to affect consumption as well as costs.	Moderately good predictability in short run. Poorer predictability over 3- to 5-year term.	Poor certainty/predictability.	Very good predictability.	Unpredictable. More so if real gains are taxed as opposed to accrued gains.
Administrative cost	User fee revenue systems may give rise to substantial costs due to rate studies, monitoring, consumption, individual billing, and expanded accounting systems.	Very low for state-collected, locally returned local income tax.	Major cost is enforcement in major transactions. Generally low administrative problems.	If land is assessed for property tax, little additional cost would result for site value taxation.	Administrative cost cannot be estimated due to lack of experience with this tax in the U.S. and because of the variety of forms of the tax.
Citizen acceptance	Generally favorable. For low-income citizens, however, use of some public services may fall below a socially desirable level.	Less favorable than Federal income tax. Citizens can be expected to oppose a "new tax."	May engender opposition as "new tax," especially from realtors.	May engender opposition as "new tax" since large rates are necessary to generate sizable revenue from small tax base.	Better acceptance if moderate gains accumulated over long periods were exempt. Tax on real rather than accrued gains would be more acceptable.

protection; however, some benefit preferentially due to higher property value. Such costs may be apportioned through service charges or taxes. Private fire protection charges are generally handled separately from standard service charges. The rate-making policies of almost all investor-owned utilities are regulated by state commissions, and some states also regulate publicly owned utilities.

Table 19 summarizes the predominant rate structures employed for water

Table 19

Rate Structures for Water Sales

Service Type	Rate Structure	Description	Discussion
Metered	Declining block	Charge per unit volume lower for larger water users	One commonly used means of distributing costs among consumers, but does not promote conservation
	Inverted block	Charge per unit volume higher for larger water users	Promotes conservation
	Fixed block	Charge per unit volume regardless of volume used	Balanced approach between declining and inverted block rate structures
Flat rate	Uniform rate	Same charge per customer	Least expensive and simple to administer as meters or meter readers are not required, but savings may be offset if water is wasted because of greater production requirements resulting
	Modified	Charge per customer based upon physical features that indicate relative consumption such as number of residents, rooms, or fixtures	Advantages of uniform flat rate but with charges in proportion to water use potential

sales in the United States. Medium and large utilities typically employ metered sales, using a declining block rate structure. The declining block structure is often used, but is being increasingly questioned as an equitable means of allocating costs. The inverted block structure has the advantage of promoting conservation, especially among large users.

Flat rate service does not require meters or meter reading. This may be a significant advantage, especially for small utilities. This rate structure is obviously the easiest to administer; however, it has little regard for services required by individual users and may promote water waste. In order to improve equity in cost allocation, some municipalities employ a modified flat rate structure that apportions costs according to type of plumbing fixtures and number of inhabitants or rooms. Flat rates may encourage water waste and encroach on plant capacity.

Service and use charges represent the major funding source for system operation and maintenance. Rates should reflect the full cost of operation, maintenance, and depreciation or debt service on the unpaid balance borrowed to construct the system. By including depreciation in the rates, a plant and equipment replacement sinking fund can be created. If depreciation is excluded from the rates, future borrowing will be necessary for plant replacement.

The development of equitable user fees or "rates," as they are most often called, is the topic of several publications (AWWA 1972, Sang 1982, Banker and Costanza 1983, Adams and Vogler 1983).

The basis of most rate structures is that the beneficiary should pay in proportion to the amount of benefit received. However, many public water utilities have not charged users in proportion to use and the costs have been subsidized by property tax or other sources of revenue. Principal arguments against using property tax revenues to subsidize costs include: the cost of service probably does not match user benefits, and an important source of funding for general purpose nonrevenue-producing facilities is depleted.

General purpose units of government can also subsidize user charges from other general fund monies, including: entitlement funds, sales taxes, fees, licenses, etc. Most of these sources are available to special districts. These revenue sources are not generally recommended because of the same disadvantages noted with subsidization with property tax revenues.

Local Sources of Capital

Table 20 contains a description of many local sources of capital (Theiler et al. 1981). Each source is described and evaluated for its general legality, acceptability, advantages, and disadvantages. Financing packages for specific projects should be developed in consultation with engineering, legal, and financial advisors.

Public water supply systems rely most frequently on the use of bonds to finance capital expenditures and depend on revenue from water sales to meet operating costs and retire the debt associated with capital financing. Some systems generate sufficient revenues such that transfers are made into the general fund of the political entity (municipality, county). In other cases, ad valorem taxes are collected by the political entity and are used to offset part of system operating expenses. Privately owned for-profit water systems also issue bonds to fund capital expenses, but may also use stock sales or retained earnings. Both the cost of capital and operating expenses must be met by revenues from water sales or the utility will operate at a loss.

Self-generated revenue

Direct contributions by customers are often used to finance the initial capital expenditures required to provide them with service. A typical example is the situation where builders are required to build the water distribution system in a new development such as a housing subdivision. Another example would be the capital contribution by an industry for the construction of a long water transmission line to service that particular industry.

Contributions by customers are essentially "buy-in" fees or a one time charge for new hookup to an existing water system based on the concept of paying a pro rata share of the capital facilities required to provide water service. Connection fees are not recommended as a means of generating operating costs of new or expanded systems.

Bonds and notes

Capital funds required for the initial construction and/or physical improvement of a water supply system are often generated through the issuance of short-term notes or long-term bonds. A bond is an interest-bearing promise to pay with a specific maturity (Calvert 1972). Bonds associated with the financial implementation of water supply systems can be categorized into three general types: general obligation, revenue, and special assessment bonds. Each

Table 20

Local Sources of Capital

	General Obligation Bonds	Revenue Bonds	Special Assessment Bond	Industrial Development Bonds	Refunding Bonds	Leasing/Installment Purchase	Industry Assistance to Local Governments
Description	Bonds backed by the full faith and credit of the issuing agency. Issuers promise to levy additional property tax to retire debt if necessary. Promise to pay is contractual and unrestricted. These are lowest interest rate bonds.	Bonds issued without backing of full faith and credit of the issuing agency. Bonds usually retired from revenues generated by the project, financed, or, more broadly, from revenues of specified sources other than general fund.	Special assessment bonds are issued to pay for public improvement where specific private benefits exist. Payments from private individuals retire the bonds on the basis of benefit conferred.	Also called county and municipality development revenue bonds. Issued to aid industry in financing capital costs. Government incurs no debt, bonds retired by payments from industry. Bonds are tax exempt.	Bonds that are issued to change the form of outstanding debt to achieve certain advantages. Any type of bond can be refunded.	A technique by which local government can acquire equipment or public facilities immediately without the capital funds necessary for outright purchase. Lessor is a private leasing firm or a no-profit corporation.	A multitude of techniques whereby industry assists local government in delivering a broad range of urban services to citizens; i.e., industry built or financed facilities, purchase of bonds, purchase of short-term paper, third-party leasing, prepayment of taxes.
Purpose	Used by local government to finance capital projects when it is felt that the project should be paid for by the entire public, spread over a long period of time.	Originally conceived to provide front-end financing for facilities that could pay for themselves over the long run. Recent applications permit use where self-retirement of debt from the project is impossible, but pledge of other revenues permits utilization.	To enable property owners to amortize over a moderate period of years, at a low interest rate, the capital costs associated with constructing various public facilities, i.e., streets, storm drainage, water or sewer.	Must serve a public purpose whether it be attraction of industry to stimulate economic growth or the provision of services in furtherance of the public health or welfare.	Generally, to shorten term of issue, achieve more favorable interest rate, eliminate restrictive covenants of base issue, reorganize the maturity pattern, or consolidate debt.	Generally used by local governments facing substantial capital outlays who choose (for various reasons) not to pursue traditional forms of debt financing. Can be used to avoid debt limitation requirements.	To assist local government in providing needed facilities and services when it is unable or unwilling to provide them on its own. Basic purpose is to eliminate imbalances between service demands and local governmental resources.
Citizen or political acceptance	Due to referendum requirement, citizens' right to approve or reject is positive and direct on each issue.	Since facility user fees are the principal means of debt retirement, most citizen concern comes from users of facilities and how much they will pay.	Citizens who want a certain public improvement that will result in a direct and specific benefit often support this approach. Most districts are not created without some form of majority consent by the benefitting, and, therefore, paying property owners.	Citizen understanding is often a problem. Feeling that issuance of bonds is a public subsidy to a private purpose is common. Full public disclosure of total program is necessary.	Citizen understanding and a clear public purpose are probably the key to acceptance.	Generally, leasing does not seem to attract much public attention. Leasing may be particularly acceptable in a situation where standard forms of debt-backed purchases are turned down by the voters.	Most techniques would elicit positive reactions from local community. Assistance resulting in the creation of a company town may not be acceptable. Generally, most forms of assistance will be viewed as a commitment to industry stability and longevity in the community.
Advantages	Gives local governments the best possible terms. Retired from ad valorem taxation over life of issue. A hedge against inflation. Projects can be financed which do not generate revenue.	No debt limitations. Default on issue does not burden local tax payers. Voter approval not always necessary. Concept of user pays is popular.	Requires little or no capital from the issuing agency. Does not ordinarily affect community debt limits. Formal election is not required. Citizen involvement tends to shape the project into a publicly acceptable form.	May permit small industrial developments to locate in an area where private financing might preclude it. Bonds are not subject to public debt limitations. Debt retirement is by the industry, not the public. Serves as a planning tool for local governments.	Offers opportunities for flexibility in modifying community debt structure. No election required. Issuance costs are low. Net dollar gain can accrue to issuing agency.	Impact on community debt limitations can be avoided if properly structured. No vote required. Lease can be custom tailored to specific need. Lessee may still acquire title to facility at end of lease period. Facilities may be acquired faster than with use of debt financing.	Facilities and services become possible that might not exist otherwise. Front-end monies from the community are not required. Industry commitments to assist local government tend to spell stability and a positive outlook for the future.
Disadvantages	Lag time obtaining funds can be very costly. Community debt limitations could restrain logical usage. When paid off with property taxes, costs are not necessarily paid for by the project beneficiaries.	Typically higher interest rates than for general obligation bonds. In case of default, moral obligations may result in community obligations. Exposure to litigation is greater than for vote-approved general obligation bonds. Use may be limited to revenue-generating projects.	Special assessment bonds demand interest rates higher than general obligation bonds. Never 100% citizen support. Administrative costs can be high percentage of small project costs. Flexibility of bond issue may be significantly limited by statute.	Necessity for private company to deal with public sector inhibits some applications. Size and application limits restrict use. Local governments hesitate to use because of political problems and fear of hurting credit standing. Interest rates generally highest of all tax-exempt bonds.	Some administrative costs do occur. Therefore, savings must be significant enough to offset this loss.	Interest rates are usually high. Lack of clear definition still clouds some potential applications. Limit to an annual lease is a problem. Implicit interest costs in some installment purchase agreements do not reflect tax exemption of interest payments.	People who make voluntary contributions tend to attach restrictions to the "gifts." The "Big Brother" image could be created. A company town could be competitive with existing centers. Places demands on industry and resources that are not directly related to production or profit.

type of bond has distinctive features, the most important of which are described below.

Short-term notes. Funds for capital improvements can be generated through the issuance of short-term notes backed by the full faith and credit of the issuing entity. These types of issue are generally used for interim financing of construction. Short-term notes are usually repaid by the later issuance of long-term debt such as general obligation or revenue bonds.

General obligation bonds. General obligation bonds are bonds that are backed by the full faith and credit of the issuing authority for the payment of which the issuer may levy ad valorem general property taxes. The required payments for retirement of general obligation bonds may be generated from other sources such as service charges for water delivered; however, in the event of revenue shortfalls, the bond issuer has the authority to levy the necessary taxes for bond retirement. The authority to issue and limitations on the issuance of general obligation bonds by any entity are usually controlled by state or constitutions.

General obligation bonds have significant advantages over other types of bonds. Primary among these are:

a. A lower interest rate than other types of bonds because they are secured by the full faith and credit of the issuing authority.

b. A readily accessible public market.

c. Reduced overhead (administrative cost of the bond issue) because of the added "full faith and credit" security.

Revenue bonds. Revenue bonds are those bonds that are payable solely from charges made for services rendered. Revenue bonds have no claim on revenues derived from taxes or special assessments. The only obligation of the borrower is to operate the water utility in such a manner as to generate sufficient net revenue to meet the obligations of the bond issue.

In recent years, revenue bonds have become a popular means of financing water utility expansion and improvement. Advantages of the revenue bond include the following:

a. Many authorities and commissions have no other available means of raising capital.

b. Constitutional or statutory limitations may preclude issuance of general obligation bonds.

c. Improvements outside the geographical area of the issuing authority are allowed.

The use of revenue bonds is also subject to several disadvantages:

a. A generally higher interest rate is required because of the perceived higher risk.

b. Detailed review is required of the proposed bond issue and issuing authority by prospective bond buyers to include: economic justification of the project, reputation of the borrower, methods of billing and collecting, rate structures, provision of rate increases as needed to meet debt, service requirements, borrower's policy as to financial management, adequacy of reserve funds, covenants to protect revenues, and evaluation of cost and revenue forecasts.

c. Higher overhead exists because of the detailed review conducted by prospective buyers.

d. New entities with no "track record" have difficulty in marketing bonds or must pay substantial interest penalties or have severe reserve fund restrictions.

e. Bond buyers generally require that net revenues must be higher (20 to 50 percent depending on the risk of the issue) than debt repayment requirements. This margin is called "coverage."

A variant of the revenue bond is a modified revenue bond in which the primary source of revenue for bond retirement is user service charges; however, if revenue shortfalls occur, bond repayment is guaranteed by the "full faith and credit" of the issuing authority. In effect, these types of bonds are general obligation bonds. Advantages of these bonds include:

a. Low interest rate and marketability are advantages of general obligation bonds.

b. The quasi-revenue bonds may not be covered by the more stringent constitutional and statutory limitations placed on the issuance of general obligation bonds.

Special assessment bonds. Special assessment bonds are retired from the receipts of special benefit assessments rather than from general tax revenues. These bonds are issued when only certain properties benefit from the proposed improvements. The bond issuer is obligated to attempt to collect the special assessment. In the event the special assessment is not paid, it becomes a lien on the property.

The authority to issue special assessment bonds is generally granted to municipalities, special purpose districts, commissions, and other types of public entities by statute. Various limitations on this authority may be imposed.

The primary disadvantage of the special assessment bond is the higher risk perceived by the prospective bond buyer. This perception of risk results in the following:

a. Special assessment bonds usually must be sold at a higher interest rate than general obligation bonds.

b. The prospective bond buyer requires more detailed information concerning the proposed issue, causing bond overhead to be higher than that associated with general obligation bonds.

A variant of the special assessment bond is the general obligation bond that is retired through use of a special assessment. These types of issue have the characteristics of a general obligation bond issue.

Intergovernmental Sources of Capital--Federal Aid

Traditionally, public water utilities have been financed at the local level; however, significant amounts of aid for implementing water utility projects are often available from Federal programs. There have been many different programs set up for specific purposes. They may provide money for facilities to be constructed within specific geographic areas, for projects that can be started quickly to assist the economy, for water source development, and so forth. A water utility should investigate all possible sources of such aid before preparing financial plans for any project.

Federal aid includes both direct financial assistance and technical services programs. Direct financial assistance programs are typically limited to the provision of financial assistance for capital improvement projects. Federal financial aid for operation and maintenance purposes is not generally available. Direct financial aid may be in the form of grants, loans, or loan guarantees. Indirect financial aid may be available in the form of project construction, i.e. including water supply storage in a flood control reservoir. Assistance in the form of technical aid may also be available from a variety of agencies that do not have a monetary assistance program. For example, the USGS will provide consulting services on the quantity and quality of groundwater in a particular location.

The variety and magnitude of Federal aid programs change from year to year. Proposed projects must be specifically evaluated to determine the eligibility to participate in one or more of the aid programs. The appropriate administering agency should be contacted during a project's conceptual planning phase to determine eligibility. In many cases, a project can be modified to meet eligibility requirements.

The various Federal aid programs are generally administered through

offices located in the several states or in subareas located throughout the state. These offices serve as the direct point of contact on the Federal aid programs. The more significant Federal aid programs operated within the study area along with the administering agency are discussed below.

Farmers Home Administration

The largest single source of financial assistance for the construction of water supply systems is the FmHA. The FmHA is authorized to provide financial assistance for water facilities in rural areas and towns of up to 10,000 population. Assistance may be provided to such public entities as municipalities, counties, and special purpose districts. In addition, Indian tribes and nonprofit corporations such as water associations are also eligible to receive assistance. Priority for assistance is given to public entities in areas smaller than 5500 people to restore a deteriorating water supply, and improve, enlarge, or modify a water system. Preference is also given to projects which involve the merging of small systems.

In addition to the above, the entity applying for assistance must demonstrate the following:

a. The inability to obtain needed funds from other sources at reasonable rates and terms.

b. The legal capacity to borrow and repay loans and to pledge security for loans.

c. The ability to operate, maintain, and manage the facilities or services for which financial assistance is provided.

d. A financially sound system based on taxes, assessments, revenues, fees, or other satisfactory sources of income to pay all facility costs including operation, maintenance, retirement of indebtedness, and maintenance of an adequate reserve.

e. Consistency with any development plans of the state, multijurisdictional area, counties, or municipalities in which the project is located.

f. Compliance with all Federal, state, and local laws including those concerned with zoning regulations, health and sanitation standards, and the control of water pollution.

Financial assistance provided by the FmHA may be in the form of loans, loan guarantees, and/or grants. In general, loans and grants are the predominant form of financial assistance. The FY 83 budgets for loans and grants to water systems in the states within the study area are presented in Table 21. Grants up to 75 percent of system cost are available to those systems demonstrating need. Grant amounts are determined through application of several

Table 21

FmHA Water System Financial Aid Program for FY 83*

State	Loan	Grant
Alabama	10.2	3.3
Kentucky	11.9	3.8
Mississippi	10.5	4.5
Tennessee	11.5	3.6

* Amounts indicated are in millions of dollars.

mathematical formulas incorporating median family income and cost of service for similar systems.

Grant and loan monies may be used for the following general project purposes:

a. Construct, repair, improve, expand, or otherwise modify water supply and distribution systems including water supply reservoirs, pipelines, wells, pumping plants, and treatment facilities.

b. Acquire a water supply or a water right.

c. Pay necessary fees such as legal and engineering connected with development of facilities.

d. Pay other costs related to the development of the facility including the acquisition of right-of-way and easements, and the relocation of roads and utilities.

e. Finance projects in conjunction with funds from other agencies or those provided by the applicant for assistance.

The interest rate and terms of FmHA loans may vary between projects. The maximum term on all loans is 40 years; however, the allowable repayment period cannot exceed any statutory limitation on the organization's borrowing authority nor the useful life of the facility being financed. Loan interest rates also vary between projects and are subject to rapid fluctuation. In addition, the element of need is also used to calculate an appropriate interest rate on each project. Current (August 1983) loan rates vary between 5 and 9-1/8 percent depending on the qualifications of the entity seeking assistance.

Although the FmHA is primarily a source of financial assistance, technical assistance related to project accomplishment is also provided. The FmHA will provide advice to the applicant as to how to assemble information to determine engineering feasibility, economic soundness, cost estimates, organization, financing, and management matters in connection with the proposed

improvement. This assistance, however, is merely advisory in nature. For FmHA-funded projects, the applicant is required to engage the services of a licensed engineer and attorney to perform any required professional services, i.e. preparation of engineering plans and specifications, right-of-way acquisition, bond work, etc.

The typical FmHA project will require from 1 to 2 years to complete. Potential problem areas are delays by the engineer, delays by the attorney, and lack of funds by the FmHA. Funding of projects is generally first-come-first-served; however, an attempt is made to equalize funding levels across the various FmHA Districts. Priority is also given to applications from existing FmHA-financed systems for extensions and/or system consolidation loans.

Processing of applications for financial assistance from the FmHA is primarily handled at the District level. Local county offices, however, usually serve as the initial point of contact for FmHA services and can provide information on how to contact a District office.

Alabama. The FmHA state office in Alabama may be contacted at the following address:

Farmers Home Administration
474 South Court Street
Montgomery, AL 36104
(205) 832-7068

The study area includes portions of three FmHA Districts in Alabama. The Districts and their respective counties are presented in Table 22.

Kentucky. The FmHA state office in Kentucky may be contacted at the following address:

Farmers Home Administration
333 Waller Avenue
Lexington, KY 40504
(606) 233-2733

The study area includes portions of one FmHA District in Kentucky. The District office may be contacted at the following address:

Farmers Home Administration
Douglas E. Oates Building
Madison Square Shopping Ctr.
Madisonville, KY 42341
(502) 825-1762

Table 22

FmHA Districts in Alabama Study Area

District Number	District Address	Counties Served
1	P.O. Box 8 508 East Court Street Moulton, AL 35650 (205) 974-7607	Colbert, Franklin, Lauderdale, Marion
2	Federal Building P.O. Box 1338 118 Greensboro Avenue Tuscaloosa, AL 35403 (205) 758-2864	Bibb, Fayette, Greene, Hale, Jefferson, Lamar, Pickens, Sumter, Tuscaloosa
5	Suite 200 951 Government Street Mobile, AL 36604 (205) 690-3194	Baldwin, Choctaw, Clark, Marengo, Mobile, Washington

Mississippi. The FmHA state office in Mississippi may be contacted at the following address.

Farmers Home Administration
Suite 831
Federal Building
Jackson, MS 39269
(601) 960-4316

The study area includes portions of three FmHA Districts in Mississippi. The Districts and their respective counties are presented in Table 23.

Tennessee. The FmHA state office in Tennessee may be contacted at the following address.

Farmers Home Administration
Room 538 Kefauver Federal Building
801 Broadway
Nashville, TN 37203
(615) 251-7341

The study area includes portions of three FmHA Districts in Tennessee. The Districts and their respective counties are presented in Table 24.

Appalachian Regional Commission

The Appalachian Regional Commission (ARC) is a regional economic development agency that represents a cooperative effort between Federal, state, and

Table 23

FmHA Districts in Mississippi Study Area

District Number	District Address	Counties Served
6	Aust Building 603 E. Church Street P.O. Box 373 Booneville, MS 38829 (601) 728-8104	Alcorn, Prentiss, Tishomingo
7	Old Bank Building P.O. Box 27 Calhoun City, MS 38916 (601) 628-6601	Chickasaw, Itawamba, Lee, Monroe, Pontotoc
8	209 S. Lafayette Street P.O. Box E Starkville, MS 39759 (601) 323-8031	Clay, Lowndes, Noxubee, Oktibbeha
9	25 Scanlon Street P.O. Box 220 Newton, MS 39345 (601) 683-6175	Kemper, Lauderdale

Table 24

FmHA Districts in Tennessee Study Area

District Number	District Address	Counties Served
7	P.O. Box 421 Gallatin, TN 37066 (615) 452-8350	Benton, Houston, Humphreys, Stewart
8	P.O. Box 789 Lawrenceburg, TN 38464 (615) 762-4795	Decatur, Hardin, McNairy, Perry, Wayne
10	P.O. Box 606 Union City, TN 38261 (901) 885-6480	Henry

local government. Annually, Congress appropriates funds which are transferred to ARC to fund its highway and area development programs, the latter providing support for community facilities, health, education, housing, energy, and other essential economic development projects (ARC 1981).

Financial assistance from the ARC is usually in the form of a 50/50 matching grant. Nonprofit organizations as well as political subdivisions such as municipalities, counties, and water districts are eligible for financial assistance. Financial assistance can be used for planning, engineering, construction, and start up of water utility projects.

Financial assistance from ARC is primarily designed to encourage economic development. Two programs administered by the ARC are possible sources of funds for a prospective water utility. These include the Jobs and Private Investment Program and the Distressed Counties Program. The Jobs and Private Investment Program supports the creation and retention of private sector jobs, upgrades manpower for jobs, or stimulates private sector employment. A typical water utility project might include expansion of a water system to meet the needs of an industry that would otherwise have to relocate. The Distressed Counties Program is designed to assist in meeting the most severe needs for safe drinking water and affordable waste disposal. Typical water utility projects might include: extending, rebuilding, or consolidating small water systems to ensure safe drinking water and designing and constructing systems for communities and small settlements where existing wells are polluted or have gone dry. In addition to direct financial assistance, the ARC can provide technical assistance in strengthening management of water systems in distressed counties.

The legislation establishing the ARC defines Appalachia as including 397 counties in 13 Appalachian states with a population of over 20 million (ARC 1982). Counties in two states of the study area for this report are within the limits of the ARC and therefore eligible for participation in the ARC grant program. Table 25 lists the eligible counties by state.

Alabama. In Alabama, the point of contact for detailed information concerning ARC grants is as follows:

Table 25

Counties in the Study Area Eligible for ARC Financial Assistance

State	Counties
Alabama	Bibb, Colbert, Fayette, Franklin, Jefferson, Lamar, Lauderdale, Marion, Pickens, Tuscaloosa
Mississippi	Alcorn, Chickasaw, Clay, Itawamba, Kemper, Lee, Lowndes, Monroe, Noxubee, Oktibbeha, Pontotoc, Prentiss, Tishomingo

Office of State Planning and Federal Programs
ATTN: Appalachian Regional Commission
3465 Norman Bridge Road
Montgomery, AL 36105
(205) 288-3086

Mississippi. In Mississippi, the point of contact for detailed information concerning ARC grants is as follows:

Governor's Office of Federal-State Programs
ATTN: Division of Appalachian Development
P.O. Box 1606
Tupelo, MS 38801
(601) 844-1184

Economic Development Administration

The Economic Development Administration (EDA) is a potential source of financial assistance for the construction of new or improved water supply facilities where such facilities are necessary for industrial development or job creation. Funds are not available for general water utility development. Financial assistance in the form of grants, direct loans, and loan guarantees may be available to qualifying agencies. Typically, grants are made to local governments (municipalities and counties) and loan guarantees are made for private enterprise eligible for assistance.

In order to obtain EDA assistance, the proposed project must meet rather stringent criteria for job creation. A typical EDA water utility project would be a grant to fund a water transmission and distribution system for an industrial park.

Because of the qualification criteria, proposed projects should be discussed with the EDA during the initial phases of the project.

Alabama. In Alabama, correspondence or inquiries to the EDA may be addressed to:

Office of Economic Development
710 North 20th Street
Birmingham, AL 35203
(205) 254-2799

Kentucky. In Kentucky, correspondence or inquiries to the EDA may be addressed to:

Office of Economic Development
P.O. Box 241
Hopkinsville, KY 42240
(502) 885-5311

Mississippi. In Mississippi, correspondence or inquiries to the EDA may be made to:

Office of Economic Development
308 Federal Building
100 West Capitol Street
Jackson, MS 39269
(601) 960-4342

Tennessee. In Tennessee, correspondence or inquiries to the EDA may be addressed to:

Office of Economic Development
145 Federal Building
Nashville, TN 37203
(615) 251-5911

Small Business Administration

Private for-profit businesses in the water supply industry may be eligible for assistance from the U. S. Small Business Administration (SBA). Under a Congressional mandate, the SBA assists the Nation's small businesses through a number of programs and efforts. The SBA helps new or growing small firms meet their financial needs; counsels small firms with problems; offers special assistance to minority, woman-owned, and veteran-owned businesses; and acts as a special advocate for small businesses with other Federal agencies, state agencies, or private sector entities. Business loan proceeds can be used for

working capital; purchase of inventory, equipment, and supplies; or for building construction and expansion.

The SBA offers two basic types of business loans. First, loans may be made by private lenders, usually banks, and guaranteed by SBA. By law, SBA can guarantee a portion of a loan made by a bank or other private lender; however, SBA's guaranty cannot exceed $500,000. Second, loans may be made directly by the SBA to the qualifying business. In general, SBA direct loans carry interest rates slightly lower than those in the private financial markets. They are available only to applicants unable to secure private financing or an SBA-guaranteed or participation loan. The maximum direct loan is $150,000.

Eligibility to participate in a SBA program must of necessity be determined on a case-by-case basis. General eligibility requirements include the following:

a. The applicant business must be independently owned and operated for profit, not dominant in its field, and must meet certain standards in terms of employees or annual receipts.

b. The applicant business must not be able to obtain funds and on reasonable terms from a bank or other private source.

c. The applicant for a loan must agree to comply with SBA regulations that there will be no discrimination in employment or services to the public, based on race, color, religion, national origin, sex, or marital status.

At present, eligibility for loans varies by industry type and SBA program. Specific information concerning SBA assistance must be obtained from the SBA on a project-specific basis.

Alabama. In Alabama, correspondence or inquiries to the SBA should be addressed to:

Small Business Administration
908 South 20th Street
Birmingham, AL 35256
(205) 254-1344

Kentucky. In Kentucky, correspondence or inquiries to the SBA should be addressed to:

Small Business Administration
600 Federal Place, Room 188
P.O. Box 3517
Louisville, KY 40201
(502) 582-5976

Mississippi. In Mississippi, correspondence or inquiries to the SBA should be addressed to:

Small Business Administration
322 Federal Building
100 West Capitol Street
Jackson, MS 39269
(601) 960-4378

Tennessee. In Tennessee, correspondence or inquiries to the SBA should be addressed to:

Small Business Administration
1012 Parkway Towers
404 James Robertson Parkway
Nashville, TN 37219
(615) 251-5881

U. S. Department of Housing and Urban Development

Although financial assistance formerly furnished through the U. S. Department of Housing and Urban Development (HUD) block grant program has been largely replaced by the state block grant programs, limited financial assistance from HUD may be available under HUD's Urban Development Action Grant Program (UDAG). The UDAG is primarily a jobs-oriented program that can be utilized to finance specific qualifying projects. Financial assistance can be in the form of loans, interest subsidies, lease financing, or equity investments.

Assistance is available to those "distressed" cities meeting HUD's various eligibility criteria. A current listing of eligible cities is maintained by HUD. Since the availability of assistance is project-specific, HUD must be consulted in order to determine project eligibility.

Alabama. In Alabama, correspondence or inquiries to HUD should be addressed to:

U.S. Department of Housing and Urban Development
Daniel Building
15 South 20th Street
Birmingham, AL 35233
(205) 254-1672

Kentucky. In Kentucky, correspondence or inquiries to HUD should be addressed to:

U.S. Department of Housing and Urban Development
539 River City Mall
P.O. Box 1044
Louisville, KY 40201
(502) 582-6141

Mississippi. In Mississippi, correspondence or inquiries to HUD should be addressed to:

U.S. Department of Housing and Urban Development
Federal Building
100 West Capitol Street
Jackson, MS 39269
(601) 960-4765

Tennessee. In Tennessee, correspondence or inquiries to HUD should be addressed to:

U.S. Department of Housing and Urban Development
One Commerce Place
Suite 1600
Nashville, TN 37239
(615) 251-5213

Intergovernmental Sources of Capital--State Aid

Alabama

There is no specific state-sponsored program for financial assistance to water utilities in the State of Alabama. The only source of state financial assistance is the Community Development Block Grant (CDBG) Program administered by the Office of State Planning and Federal Programs. Under the CDBG Program, a variety of subprograms are available. These include the Economic

Development Fund, Planning Funds, Discretionary Funds, County Fund, Large City Fund, and Small City Fund.

Economic Development Fund. The Economic Development Fund is a reservation of money to fund activities necessary for economic development projects. The funds will be allocated on a competitive basis in three or four separate funding cycles. Applications may be submitted any time during the program year and all applications received on or before the submission date will be considered for a corresponding funding period. Eligible applicants are all nonentitlement local governments. Any uncommitted Economic Development Funds will be used to fund the highest rated unfunded proposal(s) from the Small City, Large City, and/or County Fund(s).

Planning Funds. Planning Funds will be allocated to those local governments who demonstrate the need for local planning and who are willing to match funds on a dollar-for-dollar basis. If there are not enough applications to use available funds, they will be reallocated to the Economic Development Fund. Eligible applicants are all nonentitlement local governments.

Discretionary Funds. The Discretionary Funds is a reservation of money to provide funding for eligible CDBG activities which are necessary to address critical situations resulting from disasters, imminent threats to health and safety, or other needs; and to react quickly to opportunities where an exceptional economic development project may be lost if money is not available to provide necessary public facilities such as water, streets, and sewer. Funds from this reservation may also be used to aid in distributing funds to areas of the state with identifiable needs which have not received an equitable share of funds.

County Fund. The County Fund is a reservation of money for county governments to be awarded on a competitive basis. Eligible applicants are all counties except Jefferson County which meet the eligibility requirements listed under Thresholds. Applications may be made for single purpose or comprehensive programs but no multiyear commitments will be made.

Large City Fund. The Large City Fund is a reservation of money for cities of 4000 or more population and funds are to be awarded on a competitive basis. Eligible applicants are all nonentitlement cities with populations of 4000 or more which are not members of the Jefferson County consortium and which meet eligibility requirements listed under Thresholds. Applications may

be made for single purpose or comprehensive programs but no multiyear commitments will be made.

Small City Fund. The Small City Fund is a reservation of money for cities under 4000 in population and funds are to be awarded on a competitive basis. Eligible applicants are all cities with a population of under 4000 which are not members of the Jefferson County consortium and which meet eligibility requirements listed under Thresholds. Applications may be made for single purpose or comprehensive programs but no multiyear commitments will be made.

Grant ceilings have been established in each of the categories of funds. Table 26 summarizes established grants or grant/loan limitations.

Table 26

Grant/Loan Limits for the Community Development Block Grant Program in Alabama

Single Purpose Program		
Counties	Large Cities	Small Cities
$350,000	$350,000	$300,000
Comprehensive Program		
Counties	Large Cities	Small Cities
$500,000	$750,000	$500,000
Planning		
All communities - $10,000 (to be matched on a dollar-for-dollar basis by the locality)		
Economic Development		
All communities -		
Grant for public infrastructure	Grant/loan combination (provided grant portion does not exceed $150,000)	Loan
$150,000	$250,000	$250,000

Two types of grants are available under the County, Large City, and Small City Funds: single purpose and comprehensive. Single purpose grants are

designed for communities to address and resolve a specific community development need. A grant will consist of one primary activity and incidental activities if appropriate. The grant appplication should address an essential community need(s) falling in one of the following program areas: housing or deficiencies in public facilities that affect the public health and safety. Comprehensive grants are designed for communities to address a substantial portion of the identified community development needs of a defined concentrated area. A comprehensive grant should involve two or more activities related to each other that will be carried out in a coordinated manner. The grant may include activities in the areas of housing, public facilities, and commercial development related to downtown and/or neighborhood redevelopment. The program must be developed through assessment of the applicant's housing, community development, and economic needs.

Grants and/or loans are awarded on a competitive basis in each category. The administering office publishes complete guidelines on program participation and provides assistance in preparation of grant applications. Applications for assistance and inquiries concerning the CDBG Program should be addressed to:

State of Alabama
Office of State Planning and Federal Programs
135 S. Union Street
Montgomery, AL 36130
(205) 832-3889

Kentucky

Two sources of financial aid are available through state channels in Kentucky. First, the state administers the Community Development Block Grant (CDBG) Program. Second, the state administers the state-funded Area Development Fund (ADF) Program. Neither program is designed specifically for assisting water utilities.

CDBG Program. The CDBG Program in Kentucky is administered by the Office of Community Development of the Department of Economic Development of the Kentucky Commerce Cabinet. All cities and counties within the study except the City of Hopkinsville are eligible for participation in the CDBG Program. Inquiries concerning the CDBG Program may be made to the following address:

Department of Economic Development
Office of Community Development
22nd Floor, Capital Plaza Tower
Frankfort, KY 40601
(502) 564-2230

The CDBG Program is not specific to water utility projects and grants are awarded on a competitive basis to counties and municipalities submitting applications in one or more of three possible program areas: economic development, housing, and public facilities. Of primary interest to a water utility is the public facility program area. Typical projects funded under this program area include street, water, sewer, sidewalk, and drainage improvements. Funds may be used for the acquisition, construction, reconstruction, rehabilitation, or installation of certain publicly owned facilities and improvements including water utilities.

Each jurisdiction is allowed to submit only one Public Facilities application. The grant ceiling for a Public Facilities application is $650,000. The state reviews all proposed project activities to determine their eligibility. If some proposed activities are ineligible, the review and possible grant will be restricted to eligible activities. Questions concerning eligible activities should be directed on a project-specific basis to the Office of Community Development.

ADF Program. Kentucky's ADF Program is a capital improvements grant program established in 1976. The ADF Program is funded through the expenditure of coal severance tax revenue. The ADF Program is funded on a continuing basis and is currently funded through the 1982-1984 biennium. Eligible applicants include cities, counties, special districts, nonprofit corporations serving government functions, and agencies created by the Interlocal Cooperation Act.

The ADF funds are allocated to Kentucky's 15 Area Development Districts (ADD's) according to a formula based on population, per capita income, and manufacturing employment. The ADD Boards of Directors are responsible for selecting and recommending capital improvement projects to the Department of Local Government and the Finance and Administration Cabinet. The Board of Directors usually surveys and prioritizes capital improvement needs on an annual basis.

Public capital improvement projects eligible for ADF grants include:

a. Construction, reconstruction, renovation, and maintenance of buildings and other improvements to real property.

b. Acquisition of real property and interests in real property.

c. Purchase of major items of equipment.

d. Development of industrial sites.

e. Extension or installation of water, gas, sewer, and electrical utilities.

f. Retirement of debts incurred subsequent to January 1977.

Funds from the ADF Program cannot be used for feasibility studies, master plans, consumable supplies, salaries, or other operating expenses of ADD's or local entities.

The ADF Program is a relatively small program. The two ADD's within the study area (Pennyrile and Purchase) had total available funds of approximately $352,000 in FY 83.

Inquiries concerning the ADF Program should be made to the respective ADD or directly to the state office at the following address:

Office of the Governor
Department of Local Government
22nd Floor Capital Plaza Tower
Frankfort, KY 40601
(502) 564-2382

Mississippi

Identifiable state aid funds for water utility construction and/or improvement are limited. There is no specific state program for financial assistance to water utilities. The only source of state financial assistance is the Community Development Block Grant (CDBG) Program administered by the Governor's Office of Federal-State Programs. All counties and municipalities within the study area are eligible applicants for assistance under Mississippi's CDBG Program.

The CDBG Program awards grants to cities or counties submitting competitive applications for assistance. Proposed projects must address one or more of the following program targets: public facilities and services, economic development, and housing. Improvements to a water utility will most likely be funded under the public facilities category; however, projects may also qualify in the economic development category.

The state does not set grant ceilings; however, $350,000 to $400,000

appears to be a reasonable guideline for a 12-month period. The typical single-purpose project funded through the CDBG Program has taken from 18 to 24 months to complete.

The administering office publishes complete guidelines on program participation and provides assistance in preparation of grant applications. Additional assistance in application preparation may be obtained from local planning and development districts. The CDBG Program is on an annual cycle with grant applications due on or before 1 June of each calendar year.

Applications for assistance and inquiries concerning the CDBG Program should be addressed to:

Governor's Office of Federal-State Programs
Department of Planning and Policy
1304 Walter Sillers Building
Jackson, MS 39202
(601) 359-3065

Tennessee

Two sources of financial aid are available through state channels in Tennessee. First, the state administers the Small Cities Community Development Block Grant (SCCDBG) Program. Second, the state administers a state-funded loan program as authorized by The Waterworks Construction Loan Act of 1974.

SCCDBG Program. The SCCDBG Program in Tennessee is administered by the Department of Economic and Community Development. Under this program, in Tennessee, grants are available to municipalities and counties for the construction of water utility projects. The maximum grant under this program is $500,000 for a 1-year project, $750,000 for a 2-year project, and $1 million for a regional project with two or more applicants.

Five categories of projects have been established, including: industrial location, expansion, retention; community livability; enterprise site development; water, sewer, solid waste; and housing, neighborhood revitalization. The FY 83 allocation for the water, sewer, solid waste category was approximately $6.2 million. A similar amount is anticipated for FY 84.

Applications for assistance are ranked based on selection criteria that are uniform within categories, objective and quantitative, and based on project feasibility, project impact, and community need. Project application materials are supplemented as necessary by site visits and consultation with appropriate state agencies knowledgeable about particular projects. Local

officials are permitted to establish regional priorities through their respective development districts and to submit these priorities to the state as information in the project selection process. Although these priorities are given due consideration, they are not binding on the state.

Applications are accepted annually and should be submitted to the following address:

Office of Program Management
Department of Economic and Community Development
16th Floor, James K. Polk Building
Nashville, TN 37219
(615) 741-1888

Office of Program Management staff are available to provide program details and assist in application preparation.

Waterworks Loan Act. The Tennessee Local Development Authority is authorized to issue notes and bonds for the purpose of financing loans to local government units to pay the cost of certain sewage treatment works, waterworks construction and energy, and resource recovery facilities. Each of the program loans is required to be repaid pursuant to a loan program agreement which is entered into by and among the Tennessee Department of Health and Environment, the State Funding Board, the Authority, and the local government unit. Under each loan program agreement the local government unit receiving the program loan agrees, among other things, to make payments sufficient to pay debt service on the amount of bonds or notes of the Authority issued or to be issued to finance the cost of making the program loan to the respective governmental unit.

Each loan program agreement requires that the local government unit make monthly payments to the Authority at least sufficient to pay the interest on that portion of the series of notes and debt service on bonds issued to finance the cost of making the program loan for a project. In addition, the local government units are required to commence level principal amortization payments on program loans when the financed projects become operational.

In the case of projects consisting of waterworks construction, the local government unit is required by statute to establish and collect, and if necessary to increase, such fees, rates, or charges for water service and/or to pledge other available sources of revenues as will be at least sufficient to make timely payments of principal of (including sinking fund installments) and

interest on bonds and notes (including a reserve for debt service) issued for the purpose of providing program loans. Local government units also pledge in the local program agreements such revenues from fees, rates, or charges for water service and/or receipts from ad valorem taxes as will be sufficient to pay the cost of the project.

In addition to the foregoing agreements and pledges made by the local government unit under a loan program agreement, each local government unit is required to pledge its respective allocation of state-shared taxes (not otherwise pledged) equal to the maximum annual debt service requirements on any bonds or notes issued by the Authority to finance the cost of the program loan for a project.

The Department of Health and Environment establishes the priority and determines the eligibility for water utility facility construction. The local government unit initially submits an application to the Department for a program loan. The Authority then determines whether Authority funds are available for the proposed project and, if so, whether state-shared taxes not otherwise pledged will support debt service on the face amount of the program loan, at a level and an assumed interest rate established by the Authority. If the state-shared taxes not otherwise pledged are not sufficient, the Department returns the application to the local government unit for modification or other disposition.

If the application is tentatively accepted, the local government unit must adopt proper resolutions that authorize the chief executive officer (e.g. the Mayor or County Executive) to (a) execute the necessary documents, (b) commit the local government unit to accept the method of financing determined by the Authority, (c) levy fees, rates, charges, and/or ad valorem taxes, if necessary, sufficient to amortize the program loan, and (d) confirm that the local government unit cannot otherwise obtain necessary funds at a reasonable cost.

The chief executive officer then executes the loan program agreement with the following required attachments for submission to the Department:

a. The application.

b. The authorizing resolutions of the local government unit.

c. A description of the entire proposed project.

d. An incumbency certificate relating to the signator of the loan program agreement.

e. An opinion of the attorney for the local government unit relating to legal matters.

f. A certificate of the chief executive officer attesting to the representations made in the loan program agreement.

g. A letter from an independent licensed engineer certifying on the reasonableness of the proposed project estimated total cost and the estimated completion date.

h. A copy of the charter of the local government unit, or a certificate of its existence under state law.

The loan program agreement is signed by the Commissioner of the Department to indicate Department approval of the project and by the Commissioner of the Department of Finance and Administration to confirm that Authority funds are available. The loan program agreement is then presented to the Authority for approval. Upon approval by the Authority, the loan program agreement is then forwarded to the State Attorney General for approval in form.

Payments to the local government unit are made by the Authority against invoices and/or payment documents upon approval of the Department. Advances may be made to a local government unit for 1-month advance requirements, pursuant to certification by the engineer. Additional advances are not made until the Authority receives documents approved by the Department supporting expenditure of the previous advance.

Local government units may select a repayment period for the loan agreement not to exceed the useful life of the project or 30 years, whichever is less. For nonoperational projects financed from note proceeds, repayments are made in amounts at least equal to the interest cost on the loan program agreement. When the project becomes operational, repayments are made in amounts at least equal to the Authority's interest cost on the loan program agreement, together with an appropriate principal amount computed on the basis of level principal amortization for the remaining life of the loan program agreement. For all projects financed from bond proceeds, repayments are made in amounts sufficient to pay debt service requirements on the local government unit's respective portion of bonds issued for such purposes.

Details concerning the waterworks loan program may be obtained by contacting the following agency:

Tennessee Local Development Authority
Suite 1600
James K. Polk State Office Building
Nashville, TN 37219
(615) 741-4272

PART V: INNOVATIVE AND CREATIVE IMPLEMENTATION TECHNIQUES

Institutional Arrangements

Institutional implementation is primarily concerned with the legal, managerial, and social aspects of the formation, operation, and maintenance of a water utility. In most cases the technical means are available to implement a proposed water utility project; however, the institutional questions of citizen attitudes, organizational arrangements, and state and Federal policies often present more serious constraints than do the engineering requirements. This is particularly true in those cases in which the water utility project involves additional source development.

In many cases, public and private decisionmakers acknowledge that existing institutional arrangements are inadequate to meet the needs of continued economic growth. Often, these same leaders recognize that the legal mechanisms for formulating an appropriate institutional arrangement are available; however, the political will to use the available legal and administrative mechanisms is absent.

Several "innovative and creative" institutional arrangements have been proposed for application to water utility project implementation. The institutional concepts that are commonly proposed as innovative solutions have been used many times for solving specific water supply problems. The three innovative institutional arrangements being touted at present are regionalization, consolidation/coordination, and privatization.

Regionalization

Interest in regionalization of water supply systems has been widespread. Various concepts for regionalizing, consolidating, or sharing functions have often been proposed and/or used in an effort to reduce operating costs of individual water systems (USEPA 1979). These options have appeared most attractive for small systems. The possible institutional arrangements encompassed by these concepts are wide ranging, and thus there are no widely accepted definitions. The term "regionalization" typically refers to the merging of ownership, administrative, and operation functions and, when desirable, of the physical facilities, between two or more water supply systems.

Regionalization options. Regionalization generally requires the creation

of a new management or political entity to operate and maintain the water systems. Regionalization options result in the reorganization of the participating entities regardless of their previous status. When implemented, the affected systems generally do not revert to their original ownership and policy control status. Thus, regionalization is more direct in its impact on the existing water utility owners than are the changes resulting from increased coordination or consolidation of functions.

The USEPA (1983) identified four regionalization options, including: associations or nonprofit water supply corporations, local special-purpose districts, annexation, and area-wide special district/authorities. The relative advantages and disadvantages of each of the regionalization options is presented in Table 27.

Each of these regionalization options requires either the creation of a new water utility entity or a shift in policy control or functions among existing entities. These adaptations thus involve local provider, utility, or governmental realignment or reorganization. Such adaptation is accomplished either by enlargement of an existing unit or by creating a new entity to accommodate a locality's new or changing water supply requirements. The regionalization options generally provide more permanent solutions to an area's water supply problems than do consolidation/coordination schemes. The new or larger entities can seek a much greater range of financing sources, often critical to capital improvement projects, and can support a more talented management and technical staff.

Associations or nonprofit water supply corporations are functionally equivalent in their characteristics and functions. Usually created under the authority of a state charter, these entities commonly exist in unincorporated and largely rural areas. Some, however, have grown to occupy a sizable portion of a county, either by extending service into previously unserved areas or by consolidation of existing systems.

Associations (and nonprofit water supply corporations) are the simplest structural regionalization option available. They are relatively easy to create and usually have little effect on existing local government organization and service functions. The representatives of the participating entities who wish to form an association normally petition the state for authority to operate. As a part of the petition, the participants designate a board of directors responsible for the policy control of the association. Decisionmaking

Table 27

Advantages and Disadvantages of Available Regionalization Options

Entity	Advantages	Disadvantages
Association/nonprofit water supply corporation	Easy to create Authorized to acquire water sources and construct and operate a water distribution system Power of eminent domain Authorized to issue bonds secured by assets and revenues Not-for-profit operation Authorized to seek Federal financing	No power to tax Not authorized to issue general obligation bonds Limited powers in relation to other governmental units
Local special-purpose district	Often provides the only method to provide a badly needed service Power of eminent domain Authorized to levy special assessments Can match service areas with service needs More efficient than local government Greater financial flexibility than local government Less restrictive than local government on cooperative agreements Convenient and inexpensive way to provide service in rural areas	General obligation bonds not backed by full faith and credit of parent government Restricted to revenue bonds, which can be repaid only by user revenues Powers limited directly to those required to provide service Quasi-governmental entity Susceptible to public opposition because of its permanence
Annexation	Immediate increase in service area population Makes use of infrastructure of existing water supply entity Provision of service to areas outside original jurisdictional boundaries Annexed area acquires same rights and obligations as rest of service area Realization of economies of scale Power of eminent domain Applicable to municipal services in addition to water supply	Not easy to implement Susceptible to public opposition from those not wishing to be annexed Voter approval may be required Can be politically motivated Not applicable to noncontiguous areas Capital expense required to service new customers
Area-wide special district/ authority	No state-imposed debt ceilings Timely access to major sources of capital Higher salaries to attract more technical and skilled personnel "Quasi-business" Provision of service to areas that cross jurisdictional boundaries Realization of economies of scale	Potential lack of accessibility and accountability Activities uncoordinated with those of other local governments Potentially less cost-effective

responsibilities rest with the board, which is made up of at least one representative from each of the participating entities. For a very small association, the directors are selected from the users of the proposed system.

Associations have been established in a number of states to consolidate small water systems. Their formation has generally been encouraged by their ease of creation and by their eligibility for Federal financing, primarily by FmHA grants and loans. This assistance has been used both for water system improvement and system expansion.

Associations are essentially nonprofit institutions; thus, any and all profits from water supply operations must be either applied to existing short- or long-term debt, redistributed proportionately to the customers, or placed in a sinking fund for system maintenance and improvement.

Local special-purpose districts are generally units of local government that provide a specific service to a defined geographic (service) area. These districts are differentiated from area-wide special districts (discussed later in this section) primarily on the basis of scale (a singular or few versus many communities), number of services provided (one versus a range), and impact on local government (minimal versus substantial).

Local special-purpose districts frequently offer the only mechanisms that will provide a badly needed service (water of acceptable quality and quantity) in a given area. Local governments can be restricted by debt limitations and tax base limitations; in addition, governments are also restricted by their own political boundaries. However, a local special-purpose district can establish boundaries to surround the geographic territory needing service and will have its own financing mechanisms (bond market, special assessments, etc.). Also, a local district, formed from a group of even smaller water providers, can often afford to employ more technical, highly skilled personnel than could the previous water providers individually.

Unfortunately, some of the advantages of these districts can, in real life, create impediments to their implementation. Supporters and organizers must, therefore, take into consideration and accommodate local pride and individual personalities in the communities to be served. Transfer of the water supply function to a new operator (the special district) may antagonize current owners and their customers, even though the latter will have a representative on the new group's board of directors. They may well not control the new board as they did the old system. And local pride may also surface as

districts that cross political boundaries are formed. In addition, benefits of the new system may accrue in the long term while capital costs may accrue in the short term. This may cause concern and objections among customers facing immediate special assessments who perhaps cannot visualize (or totally understand) the future gains to be achieved.

Local districts are usually created by local governments, which receive their authority from enabling state statutes. Normally, the creation of such a district begins with taxpaying residents petitioning for its establishment. After a hearing by the appropriate state or local governmental agency, the request is approved or denied. If approved, confirmational elections are held to determine voter support. After voter approval, directors are either appointed by local government officials or elected by the citizens to govern the district. Once the boundaries are set, the specific service is restricted by those boundaries, and revenues to support the service can come only from the users within that boundary.

It is difficult to characterize the specific legal requirements, organization, and powers of local districts because these entities are probably the most varied and least studied forms of local government. Nonetheless, the most common characteristics of local districts are that they possess only the powers they need to provide a specific service within their defined boundaries and are semiautonomous in respect to the parent government.

Annexation occurs as a water system extends its service area to include neighboring territory. This extension can be a change in the boundaries of a water supply service area established by law (water districts, authorities, etc.) or a change in corporate limits (incorporated communities). In the instance of private water systems and nonprofit water supply corporations that do not have recognized boundaries, extension of water service does not involve legal annexation of a geographic area.

Annexation procedures vary with the governmental character of the municipality and state involved. A municipal water system will ordinarily expand to serve the area annexed by the municipality. Also, a municipality can generally annex territory already served by an existing private water system or nonprofit water supply corporation; the municipality then has the option to invoke the power of eminent domain to acquire the system. A municipality annexing territory must generally provide a level of service comparable to that received by other areas already served by the municipality. If the

quality of service is inferior, the voters in the annexed area may petition for disannexation. Specific advantages and disadvantages of annexation are shown in Table 27.

As an example, an unincorporated area adjacent to an incorporated town lacks the reliable public water service enjoyed by the town citizens. Conversely, the municipal water department has determined that, in order to remain solvent, it must either substantially increase rates or find new customers. In meetings with community leaders and concerned citizens, town representatives present the concept of annexation as a means of extending public water supply into the unincorporated area. (Other municipal services, such as police protection, would also be extended.) After sufficient interest is generated, the question is voted on by referendum and passed. The town water department makes an initial investment by extending mains and distribution lines into the new section of town. The increased service population can now more easily absorb the costs of capital improvements and operating expenses.

The area-wide special district/authority is distinguished from the local special-purpose districts by size of area affected, the larger range of services provided (e.g., water and sewerage), and a higher degree of autonomy. In certain instances, a distinction can also be made between an area-wide special district and authority, primarily on the basis of taxing power. The nature of water supply, however, results in revenues being generated by user fees, which tends to blend the characteristics of these entities.

Similar to the local special-purpose district, the area-wide special district is considered to be a unit of government with one or more designated functions. The procedure for creating authorities varies across the country, but the most common situation is for states to pass enabling legislation authorizing county and municipal governments to create them. However, in some states, authorities can be created only by special acts of the state legislature.

Authorities are highly autonomous units although they generally cannot rely on taxation or the backing of local government for financial support. They must enter the revenue bonding market on their own and maintain an independent bond rating. This autonomy, however, presents an actual advantage in that the authority is exempt from state-imposed debt ceilings. Also, authorities can initiate projects on a more timely and cost-effective basis than can governmental units. Authorities are not subject to public referendums (which

must await an election) or bond issues; authorities can enter the bond market on their own.

Authorities, of course, have their critics. In 1977, nearly 40 percent of the authorities and area-wide special districts were administered by appointed officials; the potential, therefore, exists for those running the authority to be unaccessible and unaccountable to their customers. Also, the financing of authority projects has caused difficulty in some communities. Being somewhat outside of government, authorities may not be permitted to take advantage of centralized administrative services and purchasing, nor are they subject to governmental audit services. Local government purchasing procedures can be more cost-effective than those of an authority; therefore, an authority's projects may cost more than those of a governmental entity. Lastly, as an autonomous entity, the authority is interested (and generally knows about) only its own projects. Its directors are not involved in the governmental budgetary process and are unaware of the financial priorities being set for the jurisdictions involved.

In summary, authorities are a highly feasible means for financing and providing service although they frequently assume the responsibility of other local governments. Authorities appear to be an essential element of local government, but their principal difficulty is their inability to create the necessary policy and budgetary relationships with overlapping general local government(s).

Regionalization attributes. Thackston et al. (1983) discusses in detail both the advantages and disadvantages of regionalization. The major benefits from regionalization programs are generally divided into four major categories: operation and maintenance, planning and design, financing, and government.

Regionalization facilitates improved and unified management of water systems by providing for more comprehensive supervision and better day-to-day direction of operations. The improvement in overall management permits more effective and extensive monitoring of water quality by water utilities on the basis of economies of scale. As a result, the capability to deliver safe potable water in sufficient quantities is improved. In most cases, the overall efficiency of water supply operations will be increased; however, an overall

increase in the cost of water supply because of improved services in the area may be expected.

From the standpoint of day-to-day operations of a water supply system, a regional operation will ensure optimum reaction to emergencies by unified service organizations and standardization of construction materials.

Regionalization allows for the optimum planning of the water supply system, particularly where the original individual systems are interconnected or could be readily connected. As a result, the coordination between overall water resource planning and development and water supply needs is improved and broadened. This improved coordination will assist in the conservation of water resources through implementation of more effective conservation practices.

The regionalization of services will distribute the cost of services over a larger geographical area and therefore result in a more uniform water rate structure. Both the physical and fiscal assets of the regionalized systems can be coordinated for maximum effectiveness. The larger geographical area and greater number of customers in a regionalized system provide a larger base of revenue. As a result, system financing can be accomplished strictly from service charges (i.e. no taxation). In addition, the larger rate base assists system financing because of the associated fiscal stability and the better bond ratings that usually result.

Regionalization assists the state regulatory agencies by reducing the number of management organizations that must be monitored. It may reduce the number of political entities that operate individually or independently of the water supply systems. This is of primary importance if the existing utilities do not have the financial capabilities of operating in a businesslike manner. The development of well-managed water utilities will reduce the opportunity or need for the state or Federal government to become directly involved in the operation and control of water utilities.

Although many advantages are purported to accrue from regionalization of water utility facilities, there are also several disadvantages that have been widely discussed in the literature. The major problem areas have been divided into three broad categories: public attitude and government, inequities in financing, and other concerns such as the apparent high cost of capital facilities.

For a variety of reasons the public and governmental attitude is

frequently against the concept of regionalization. Local community distrust and provincialism may frequently result in strong opposition to the concept of regionalization. In many cases, the public may be indifferent to water utility needs and the risk imposed by inaction. A more direct consequence of regionalization may be the loss of control of a water utility's income, which may be diverted to a regional general fund.

Governmental and political objections to regionalization are primarily based on the loss or perceived loss of power. In those cases where politics predominate, regionalization may simply mean substituting regional inefficiencies and impropriety for the local variety.

The inequities associated with regionalization may also present significant obstacles to implementation of a regional water utility project. These inequities are often more area-specific than those found in the public attitude and government category. It may be difficult to maintain equities among various and diverse areas, particularly if the proposed regional concept incorporates small, widely dispersed systems.

Actual inequities may include personnel, engineering, and financing problems. Reorganization during implementation of a regionalization plan often results in shifting highly qualified personnel into positions inappropriate to their skills. These questions concerning the future status of personnel of the individual utilities being combined into the regional system may create opposition to the regionalization effort.

Actual or perceived inequities in the financial aspects of the regionalization concept also may present significant obstacles. Some participating municipalities may be concerned about the loss of water sales revenue used for other general purpose needs. Obtaining ownership and control of privately or other publicly owned utility systems, including poorly operated systems on the verge of abandonment and in generally poor condition, may create a financial burden for the new regional systems. The equitable resolution of the assets and liabilities of the independents brought into a regional effort may create problems. There may be some concern that water revenues from established, well-operated systems will be used to finance improved service to those areas with poorly operated systems. The regional system will not have "going concern value." As a result, it may be difficult to obtain access to and credibility in the bond market and investment circles because of the lack of historical trends.

Based on a review of four regional water utility systems in Tennessee, Thackston et al. (1983) concluded that the practicality and efficiency of a regionalized water utility must be evaluated on site-specific factors. However, as relates to the initial successful organization and implementation of a regional water utility system, Thackston et al. (1983) found that a number of factors must occur simultaneously:

a. A well-defined need exists for an additional quantity of water or better water quality.

b. At least one individual believes that a regional system is required, and is willing to work for its creation.

c. The governing body of the regionalized utility's board of directors will provide adequate representation for all users.

Regionalization implementation. The implementation of regionalization schemes is discussed under the implementation of consolidation/coordination schemes.

Consolidation/coordination

Regionalization as discussed above focuses on the formation of governmental or quasigovernmental agencies to supply water utility services within a specific geographic area irrespective of political boundaries. In most cases, regionalization infers the merging of ownership, administrative, and operational functions and, when desirable, of physical facilities, between two or more water supply systems (USEPA 1979). Examples would be the formation of a county water district to assume the functions of many smaller utilities or the formation of a special district to serve several communities in a metropolitan area. Consolidation/coordination, on the other hand, refers to the implementation of formal or informal agreements between two or more water supply utilities relating to the sharing of functions and/or services without necessarily transfer or merging of ownership. Consolidation/coordination arrangements enable the individual water utilities to maintain system autonomy while benefiting from economies of scale associated with larger system operation.

Consolidation/coordination options. The USEPA (1983) identified four basic consolidation/coordination options available to water utility systems: informal agreements, basic service contracts, joint service agreements, and regional councils of local selected officials. The advantages and disadvantages of each of these options are presented in Table 28 and discussed below.

The least rigid consolidation/coordination option is the informal agreement consisting of a bartering or trading of services or hardware, as needed.

Table 28

Advantages and Disadvantages of Available Consolidation/Coordination Options

Entity	Advantages	Disadvantages
Informal agreement	Easy to create or implement Adjustable to duration of need Forerunner of more binding relationship Easy to terminate	Not legally enforceable Easy to terminate No formal continuity from administrator to administrator
Basic service contract	Easy to create No restrictions on local autonomy or policy control No governmental reorganization Adjustable to meet changing service needs and demands Realization of unit cost savings via larger quantity purchases (economies of scale) Able to provide specialized services not otherwise available No voter approval required	Easy to terminate Temporary solutions (possibly) Too expensive (sometimes)
Joint service agreement	Easy to create Realization of unit cost savings via larger quantity purchases (economy of scale) Minimal disruption of existing organizational and administrative structures More permanent than basic service contracts More uniform coordination and administration of services More efficient use of personnel, equipment, and facilities Able to provide specialized services not otherwise available Elimination of duplication of facilities Increase in overall efficiency of service No voter approval required	Impact on local autonomy and policy control More difficult to terminate than basic service contracts Benefits to outside jurisdictions that do not compensate participants Sometimes difficult to distribute costs equally Difficult to compute and equally distribute some overhead costs Difficult for participants to provide service themselves if the agreement fails
Regional council of local elected officials	Easy to create Provides centralized planning and coordination Provides forum for community and individual input to decision-making No restrictions on local autonomy or policy control	Decisions not legally enforceable No power to raise funds Relation to other governmental units strictly advisory

Informal agreements have their basis in a voluntary cooperative decision between two or more water supply entities or other service entity equipped to provide a needed function to share a commonly needed component. Informal agreements can span long terms or can be used on an as-needed basis, such as when water is supplied from one system to another on an emergency basis to accommodate system breakdowns. The provision of a water supply activity or component can involve payment in the form of money or services or may be provided without charge. Systems may informally agree to: share laboratory facilities, share storage facilities, share billing equipment, provide water on an emergency basis, and share operation and maintenance functions or personnel.

The simplest formal consolidation/coordination option is the basic service contract, which provides for the delivery of some aspect (or range) of water supply service. This contract involves the creation of a legal document between water systems or a water supply services company to provide a service to the other systems. Under a basic service contract, policymaking and financing usually remain with the recipient of the service, and the provider performs the service functions agreed upon.

Basic service contracts are the most widely used method of regional cooperation among local governmental units, public entities, and private companies and present a flexible, yet enforceable arrangement. Specific functions that may be contracted include: water purchase contracts, wholesale and retail; contract operations and maintenance, emergency and repair; water plant operation and maintenance, distribution system maintenance, and billing and collection.

The most common use of basic water supply service contracts is to provide water on a wholesale or retail basis. These contracts usually arise when raw water source quality or quantity becomes, or is determined to be, unacceptable, requiring either the construction of a sophisticated treatment system or the development of a costly new water source. These two factors alone (unacceptable water quality and quantity) have probably given rise to the creation of more water contracts than any other factors.

These contracts can also make available various types of specialized services to small water systems that are unable to obtain the necessary facilities or qualified staff to provide the services for themselves. Contract provisions of operation and maintenance and laboratory services are finding

increasing use as water systems are attempting to both upgrade the quality of service to their customers and to comply with Federal and state regulatory requirements. Existing water systems and water supply service companies are both beginning to offer these types of services to small water systems.

Joint service agreements involve the sharing or exchange of activities among two or more water systems or other service entities. A joint service agreement is normally more complex than is a basic service contract; thus, the agreement places more restrictions on the participants. Administrative decisions are typically made by a joint governing body of representatives from each participating system.

Joint service agreements establish the participating systems as partners in the provision of a particular water supply activity; parties to these agreements generally have similar levels of administrative and financial authority and responsibility. Planning, contracting, financing, and/or operating costs to provide the joint activity are shared by the systems.

Joint service agreements can be formed for the following purposes: development of a water source; ownership of system facilities including storage facilities, laboratory, maintenance facility, and vehicles; purchasing of chemicals and parts; and exchange or sharing of service activities such as operations, maintenance, billing, and collections.

As an example of a joint service agreement, two communities could discover that their existing well fields are becoming insufficient to accommodate the water supply demands created by recent population growth. Their studies indicate that groundwater can no longer be relied on for safe and dependable supplies of drinking water. A nearby river could serve as a raw water source, but neither community can afford to design and construct the required water plant. The communities determine that, together, they can afford to construct and operate the plant, as well as the transmission lines to each distribution system.

The communities decide to enter into a joint service agreement. All responsibility for decisions regarding the funding, operation, and maintenance of the plant is given to a two-member management group composed of the communities' town managers, who must vote unanimously to determine policy matters.

The cost of construction, operation, and maintenance of the plant and transmission lines is divided between the two communities, based on the

percentage of the capacity of the plant each community will use. The communities will be credited for in-kind contributions to the system, including personnel, equipment, and attorney time. In addition, the communities reserve the right to enter into purchase water contracts with other users in the area. The rights and privileges of municipal employees will not be altered by their assignments. As a result of this agreement, the communities will be able to meet their water supply needs well into the future; furthermore, the supply will be far more dependable than were their well field systems.

Different from the other consolidation/coordination options, a regional council of local elected officials provides a forum for the identification of problems common to a given area. The area of concern is one which often crosses jurisdictional boundaries. Such a council encourages common action to resolve problems so that resources are committed more efficiently, thus eliminating regional duplication of effort. Although no legal obligation results from council resolutions, participating members can agree on mutual courses of action.

As an example, several adjacent communities each own and operate their own water supply systems. None of the communities want to give up autonomy in water supply, but they realize that some degree of joint planning will be necessary, particularly to protect the integrity of raw water sources. The communities decide to form a regional council of governments and appoint elected members of the community councils as representatives. The initial mandate of the regional council is to review the water supply situation and report back to the member communities. None of the communities is bound by the recommendations of the regional council. Funding for regional council activities is provided by the member communities.

Consolidation/coordination attributes. The attributes of the consolidation/coordination options presented above are essentially the same as those presented previously for the more formal regionalization options. However, since implementation of the consolidation/coordination options allows the individual water utilities to maintain their political and administrative autonomy, these options are often preferred over regionalization.

Consolidation/coordination implementation. The implementation of consolidation/coordination schemes is often considered concurrently with more formal regionalization plans. The USEPA (1983) provides insight into the mechanism for accomplishing regionalization and/or consolidation/coordination.

There are no clear-cut pathways to the successful implementation of such schemes. The steps ultimately followed will primarily depend on the following factors: type of need to be fulfilled, location of the water system needing assistance vis-a-vis other supplies, available state enabling legislation, local political considerations, public input, cost to participants, and other factors applying to a particular situation. Figure 13 presents a suggested sequence of events for regionalization implementation. This generalized framework is not static, but attempts to present the steps most likely to be encountered in the pursuit of a regionalization plan. The key to a successful regionalization effort is to do what works.

The suggested sequence is divided into two main branches, one for consolidation/coordination options and one for regionalization options. Front-end problem identification and decisionmaking would be identical, however, until the actual option to be pursued is determined. The procedural steps associated with front-end activities are determined as follows:

a. A clear determination of the specific problem(s) facing the water supplier must be made.

b. An honest evaluation of in-house capabilities must be made to determine if the problem(s) can be solved independently, or if external assistance is required. If external assistance is not required, then the decisionmakers need progress no further in the sequence.

c. If external assistance is desired, the participant should identify both the strengths and weaknesses of neighboring water suppliers. If no reasonably close suppliers exist, or their strengths are not compatible with the first supplier's weaknesses, a structural remedy may be the only solution.

d. If compatibilities do exist with nearby suppliers, managerial level discussions should be undertaken (with owner knowledge and input) to identify means of possible cooperation. This should lead to a managerial level determination of the most appropriate regionalization option to pursue, and a determination by the respective participants to proceed or not to proceed.

At this point in the sequence, certain steps vary, depending on the type of option pursued, although similarities exist within the consolidation/coordination and regionalization options. In the pursuit of nonstructural regionalization options, the following activities should be anticipated:

a. A negotiating team of individuals selected by the water supplier(s) would work out the terms of any informal agreement or service contract. Each party to the agreement should fully understand both its obligations to the other participant(s) and the services or compensation it shall receive in return.

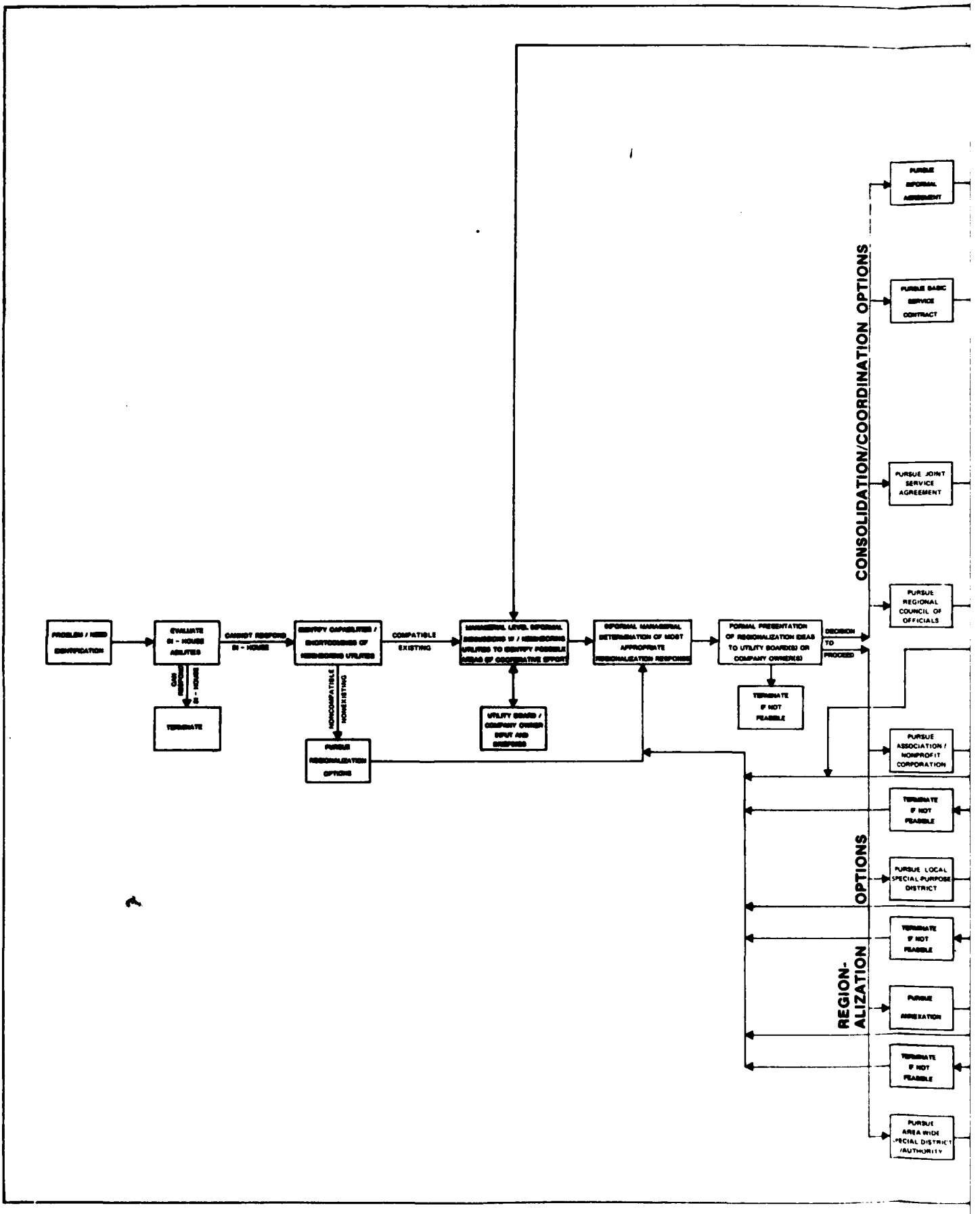
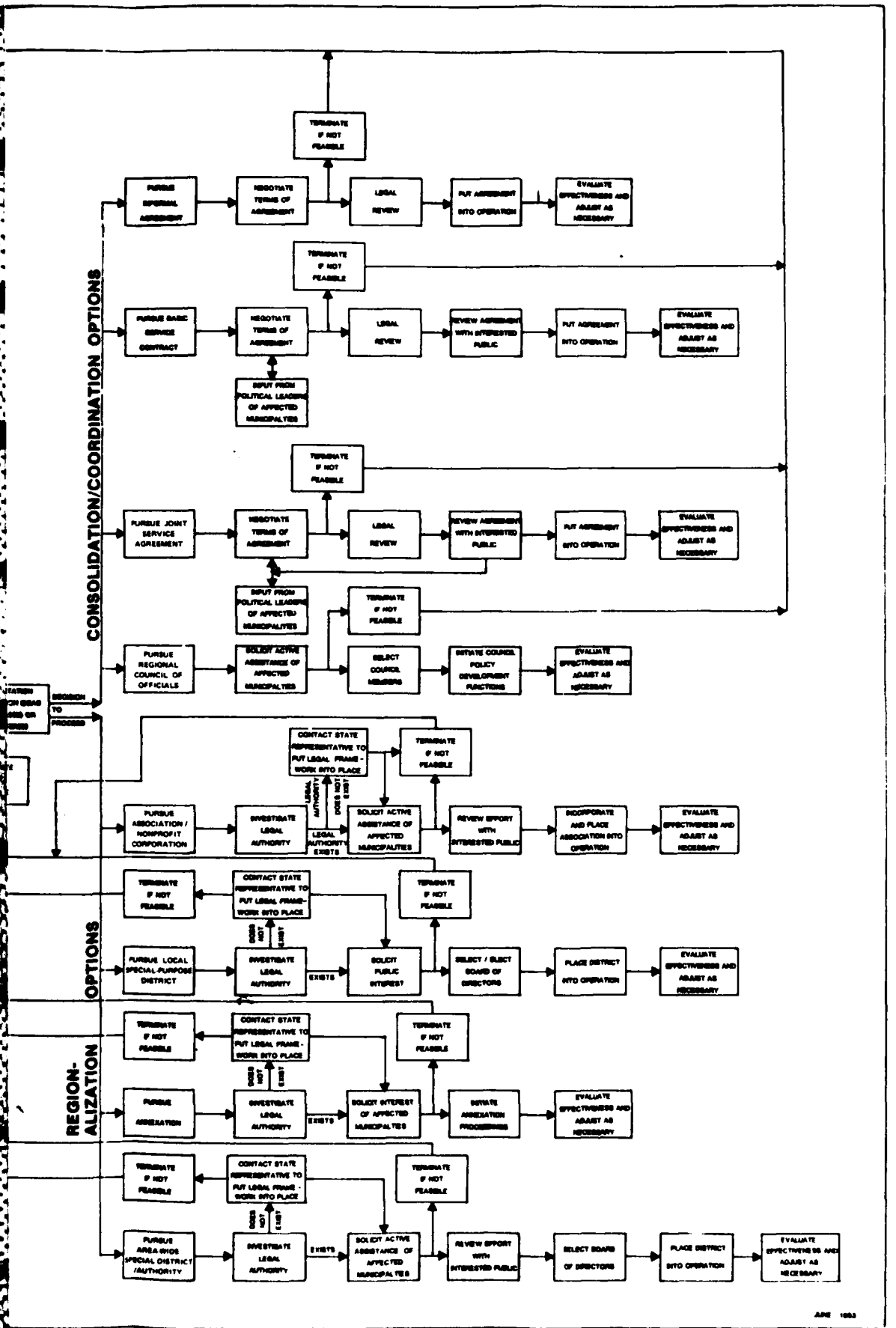


Figure 13. Suggested sequence of events for regionalization and/or conso



ation and/or consolidation/coordination implementation

b. Once the terms of the agreement or contract are negotiated, a legal review by the respective attorneys is recommended. In addition, input from local political leaders or concerned citizens should also be obtained and considered.

c. The finished agreement or contract is put into operation.

d. Finally, the document and its impact on operations should be reviewed by all parties at regular intervals to determine if its performance is satisfactory, if it should be terminated, or if an additional step to a more permanent structural approach is in order.

The only consolidation/coordination option not falling into this general framework would be a regional council of officials approach. If such an advisory steering committee is preferred, their close cooperation must be obtained among affected municipalities to initiate operations.

Concerning regionalization options, the following anticipated tasks would be common to all:

a. An investigation of the legal authority to implement the structural option would be required. Attorneys for the interested entities must determine if appropriate state enabling legislation is in place. If such legislation is required, then contact must be made with the appropriate state representative(s) to initiate action.

b. Once appropriate general legal authority is in place, the water supplier(s) pursuing structural regionalization should solicit the interest and active support of political leaders and concerned citizens in the affected municipalities for the specific option desired.

c. Finally, once local support is ensured, official creation of the structural entity, with its associated elected or appointed directors, can proceed.

As indicated in Figure 13, if at any point in the sequence of events progress must be irrevocably terminated, decisionmaking should revert to the managerial/owner consideration of options step. Also, after an option is implemented, its performance should be periodically evaluated and adjustments made as necessary.

As stated previously, this implementation framework must be tempered by local considerations. It does, however, provide a reasonable outline of the minimum actions required to guide decisionmakers in the water supply regionalization field.

Privatization

A growing trend in implementation of water utility projects is the return to private sector ownership. Private and public sector partnerships are being formed to trade upon tax benefits and efficiencies achieved by the private sector in constructing and/or operating required facilities (Goldman and

Vought 1983). Although currently more prevalent in the wastewater treatment field because of special tax benefits, the concept of privatization has also been proposed as a legitimate option for financing needed facilities in the water utility field.

Two basic forms of privatization arrangements, the concession or franchise and the affermage or "farming out," are described by Grigg and Hanke (1982). These forms have been successfully used in France for over 100 years.

Under the concession or franchise system, a public entity contracts with a private firm to construct, operate, and maintain the capital facilities as well as handle customer relations and billing. Concessions are awarded to a firm on the basis of a low bid (usually water price) for the right to supply a given quality of service over the length of the concession. The private concessionaire finances all capital works and operates all facilities at its own risk. At the end of the concession period, usually 30 years, the concessionaire must return the system to the public entity in its original condition. This means that during the life of the concession the concessionaire must replace all worn out equipment and also recover its invested capital.

In the U.S. context, a lease-purchase agreement would be similar to a French concession. For new facilities or equipment, a lease-purchase arrangement is all that is necessary; however, for existing public facilities, a sale-leaseback arrangement is necessary. In the sale-leaseback arrangement, the public entity would sell its plant and equipment to the lessor and then lease it back. The public entity is thus able to take advantage of private enterprise as well as raise working capital by sale of its capital facilities.

Affermage is the second type of system used in France (Grigg and Hanke 1982). This system is similar to a concession; however, under this scheme the system's capital works are financed and owned by the public entity. The length of affermage arrangements is generally shorter than a concession, usually running no longer than 12 years. Affermage is essentially equivalent to contract operation of facilities.

Although affermage results in lower operating and maintenance costs when compared to a completely public system operation (since the public entity continues to own the capital facilities), there is no corresponding savings in capital costs. To amortize these capital costs, the public body must add a surcharge to the tariff for system operation levied by the private firm.

Private sector involvement in constructing, owning, and/or operating a

water utility can offer many benefits. The benefits cited most often are categorized as design and construction benefits, financing and ownership benefits, and operational benefits.

Private sector ownership including associated design and construction is often described as being more efficient than public sector ownership. Time and cost savings to put essential facilities into place are reported to be significant. Savings in excess of 20 percent of the estimated project cost have been reported, due primarily to the minimization of Federal and state regulatory involvement in the process and avoiding certain public procurement regulations.

Private sector ownership of the water utility may offer several advantages in the financing arrangements for a water utility project. The privatization concept is that these cost savings are passed to the customer in the form of reduced user fees. The exact nature of any anticipated financial benefits must be evaluated on a site-specific basis. Specific categories of benefits may include investment tax credits for eligible property, rapid depreciation, and energy tax credits. Privatization transactions may be structured to take advantage of industrial development bonds. Transfer of ownership to the public sector at some future date is often included in the privatization transaction.

Problems associated with operation and maintenance are often cited as major issues in public sector ownership of water utilities. These problems are magnified for small water utilities. Many communities have found it difficult to attract and retain qualified personnel to operate modern water treatment facilities. Under the privatization concept, the community foregoes the problem with retaining a qualified staff by franchising with private sector owners/operators to provide the necessary water utility services. It is believed that communities will have an easier time monitoring performance-based contracts than maintaining qualified staff.

The private sector is believed to be able to hire and maintain sufficient qualified staff to operate and maintain sophisticated modern water treatment facilities because the private sector is usually able to offer increased benefits and responsibilities to employees. Many reasons are cited for the phenomenon, including: the comparative flexibility in salary levels, benefit programs, and employee reward systems; and the ability to achieve economies of scale tied to the opportunity to share key resources among multiple

facilities, particularly licensed operators, preventive maintenance personnel, and administrative and laboratory personnel.

Although the supporters of privatization offer many advantages as a rationale for implementation, detractors point to privatization as a return to the failures of the early part of this century. These detractors of privatization point out that the only way a water system can be implemented and/or improved by private industry is if the private owners are free to raise rates to whatever levels are necessary to construct or rehabilitate the system and to make a profit (Sharpe 1982). On the other hand, it is argued that if the system remains public, rate increases would only need to cover the costs of construction or rehabilitation.

If the privatization concept is implemented, a system of checks and balances must be established that protects the public sector interest while encouraging private sector involvement. Typical protective measures include independent construction monitoring; independent operational audits; independent financial audits, especially for rate increases over the initially negotiated base rate; and consideration of performance incentives.

Privatization may not be appropriate for every community; however, it begins with state and/or community action. Goldman and Markus (1983) proposed a procedure for evaluation and implementation of privatization concepts for a specific area. Figure 14 presents the details of a state-supported privatization implementation program.

Financial Arrangements

Background

Implementation of a water utility project is a capital-intensive process. Relatively large sums of money are required to construct treatment, transmission, and distribution systems. Traditionally, these financial requirements have been satisfied through a combination of private financing via the issuance of long-term fixed interest rate bonds (maturities of 20 to 35 years) and Federal and state financial assistance via grants and low or no interest bearing loans.

Typically, water utilities sell bonds concurrently with the start of project construction. These bonds are in an amount sufficient to complete the project or distinct portions of the project. The bonds are scheduled to mature

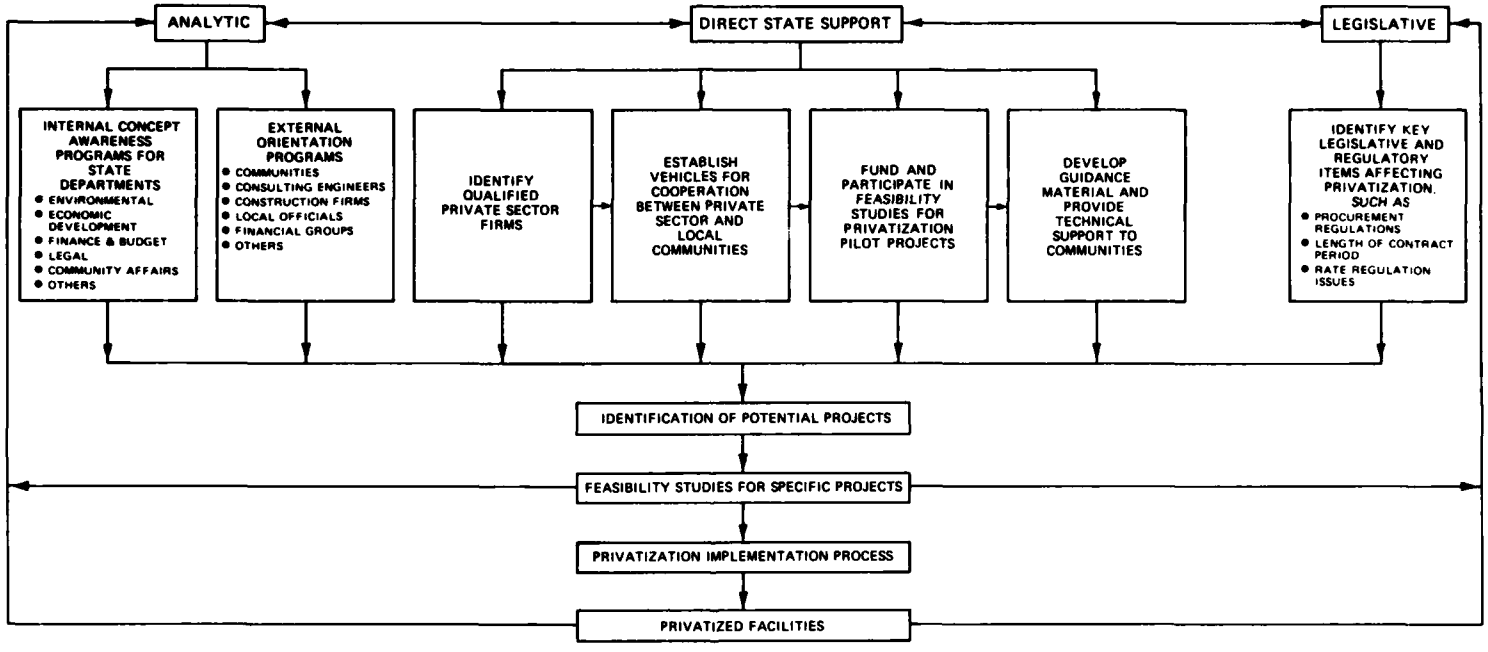


Figure 14. Proposed procedure for implementing privatization program (from Goldman and Markus 1983)

in equal annual amounts over a 10-, 20-, or 30-year period or with the sum of principal and interest paid in equal payments.

The advantages of the traditional financing technique have been cited as follows:

a. The fixed interest rate fixes the cost, simplifies the rate setting, and places subsequent market risk on the investor.

b. The long term matches the debt to the life of the asset and spreads the cost to both current and future water users.

c. Advance refunding enables the bond issue the opportunity for prepayment or advance refunding to lower borrowing costs.

d. The tax exemption lowers the cost as compared to taxable debt.

As a result of recent high interest rates, investor disenchantment, and increasing competition for capital, many of these advantages are being questioned when current market conditions are considered.

The cost of bond financing is a function of many factors including the bond rating, perceived credit worthiness of the water utility, size of the financing, call protection provided for the investor, and whether the bonds are exempt from state and local taxes (Williams 1982). The effect of ratings and maturities on financing costs are shown in Table 29.

Table 29

Water Revenue Bond Interest Costs*

Maturity years	Bond Rating			
	AAA	AA	A	BAA
5	8.75	9	9.5	10.00
10	10.25	10.50	11.00	12.00
15	11.25	11.50	11.75	13.00
20	11.50	11.75	12.25	13.25
25	11.75	12.00	12.50	13.50
30	11.75	12.00	12.50	13.50

* Values presented as percent as of 4 August 1982.

As a result of bond market uncertainty, public utilities have attempted to adjust the traditional methods of raising capital. New breeds of securities have been proposed which promise to provide more security to the investor. Correspondingly, the water utility has been required to take more of the monetary risks associated with the capital markets. The new financing

techniques are often generically referred to as "innovative" or "creative financing." From the water utilities' point of view, a technique is innovative or creative if it solves a problem such as lowering the interest rate or postponing long-term financing. From an investor's point of view, creative and innovative financing means providing the maximum yield and minimizing the risk of loss. Obviously, the goals of the investor and water utility are often contradictory.

Creative and innovative financing techniques could incorporate any number of scenarios. In essence, any legal financing scenario that could be agreed to by a willing water utility and a willing investor community could be developed. Several of the techniques that have gained recent popularity are discussed below.

Interim financing

Interim financing is short-term financing designed to pay for development costs including design, rights-of-way acquisition, equipment purchases, and project construction. Interim financing is temporary and usually repaid through refinancing with additional interim or issuance of long-term debt instruments. Although not common in the past, interim financing is being considered by more and more water utilities as a means of postponing the issuance of long-term debt at current high interest rates (Helms and Clark 1978). Alternative methods of interim financing are presented and compared in Table 30.

Bond and secured bond anticipation notes. Bond anticipation notes (BANS) are short-term notes usually maturing in 1 to 3 years payable from the proceeds of a long-term bond issue or issuance of new BANS. Since the repayment of BANS depends on the issuance of long-term bonds at some future date, there is some risk that interest rates will be higher or that the structure of the new debt issue to refund the BANS will be unsatisfactory. Additional factors affecting the prospective investor's perception of BANS are the authorization of the issuance of refunding bonds, interest rate limitations that could prohibit issuing additional debt, and if the projected revenues of the utility are sufficient to satisfy financing requirements.

A technique for improving the credit rating, thereby lowering the borrowing cost associated with additional security for payment of the BANS at maturity, is to obtain a letter of credit with a major bank. Repayment of these so-called secured BANS is most often guaranteed by the pledge of an irrevocable letter of credit from a commercial bank. The irrevocable letter of credit is

Table 30

Alternative Interim Financing Techniques

	Bond Anticipation Notes	Secured Bond Anticipation Notes	Direct Bank Loan	Commercial Paper	Demand Notes
Primary source of payment	Long-term bonds	Long-term bonds Letter of credit	Long-term bonds	Long-term bonds	Long-term bonds
Additional security	None	Letter of credit	Pledge of general credit and/or water revenues	Letter of credit may require additional security	Letter of credit
Maturity	1-3 years	1-3 years	1-3 years	15-45 days	1-3 years
Interest rate	Fixed rate of 9.0-10.5 percent	Fixed rate of 7.75-9.25 percent	Rate floats as percentage of prime rate (9-12 percent)	Fixed rate of 6.5-7.0 percent (15-45 days)	7.5-7.75 percent Varies weekly
Other costs	Usual issuance costs	Commitment fee Compensating balances	Commitment fee Compensating balances	Bank commitment fee of 0.5-1.5 percent	Bank commitment fee of 0.5-1.5 percent
Principal advantages	Accepted vehicle for better rated issuers	Lower interest cost	Simplest implementation	Lowest interest rate Issuer can pick market	Low interest rate Issuer can pick market
Principal disadvantages	Higher borrowing cost	Costs of credit facility	Interest costs could escalate appreciably No market visibility	Limited reinvestment opportunity Administrative burden of frequent rollovers	Use of credit facility may increase costs

to be used only if refunding BANS or long-term bonds could not be sold. This technique shifts the liquidity risk of BANS from the issuer and investor to the bank furnishing the letter of credit.

Direct bank loans. Direct bank loans are used for interim financing. The water utility sells notes directly to a bank or group of banks. The interest is usually computed as a floating or variable rate defined as a percentage of the bank's prime lending rate. In those cases where the rate of interest as calculated by the formula is above a statutory limit, interest accrues and is recouped by the bank when the rate formula drops below the limit.

Commercial paper. Commercial paper is a very short-term note, usually less than 45 days to maturity, that is used to enable the issuer to select a better market to issue long-term bonds or permit a more orderly marketing of long-term bonds. Although the interest rate on commercial paper is generally lower, additional costs associated with the issuance of the paper include fees for the standby letter of credit, fees for the agent placing the paper, and administrative costs associated with issuance and rollover of the notes. In the event the paper cannot be rolled over, the issuer must draw on the letter of credit to refinance the matured note. The debt then converts to a bank loan.

Demand notes. Demand notes are similar to tax-exempt commercial paper. In effect, they are secured BANS. The major difference is that the investor can either hold the note to maturity or tender the note to the issuer for redemption at the original par value upon 7 days notice. Thus, the demand note is a very short-term investment with immediate liquidity and the investor becomes willing to accept a lower interest rate. The issuer must bear the liquidity risk. The cost of demand notes is similar to that of commercial paper.

Long-term financing

Innovative and creative structuring of long-term financing has also been developed in response to current market uncertainties. The primary objective of the new structuring techniques is to lower borrowing costs; however, this is accomplished at the expense of transferring market risk from the investor to the issuer. Secondary objectives of these new techniques include the enhancement of security and marketability, market price protection, shorter maturity, higher rating, or renegotiation of the interest rate.

As is the case of interim financing, any number of techniques for

long-term financing can be developed depending on what a willing issuer can legally issue to a willing investor. Table 31 presents information relative to the more popular long-term financing innovations that have been attempted.

Tender option bonds. Tender option bonds are a hybrid of long- and short-term financing. These bonds have a stated maturity of 20 to 30 years but give the holder the option to tender bonds back to the issuer for repayment at par at the end of a specified period, usually 3 to 5 years. Thereafter the option can be exercised periodically at either 1-year or 3-year intervals. Because of the option, purchasers will accept yields as much as 2.5 percent lower than 25-year bonds without an option. The primary advantage to the water utility is the attractive interest rates. However, the savings is only ensured for the first 5 years. The issuer assumes the market risk that in subsequent years a significant number of bonds will be tendered which would require refinancing at possibly higher interest rates. Judicious use has been made of tender bonds and issuers have limited the amount of tender bonds issued to between 10 and 25 percent of a total issue (Williams 1982).

Floating rate bonds. Floating rate bonds do not have a fixed interest rate; they vary or float with the bond market. The interest rate is usually tied to an accepted market index. The computed index must produce a yield or a return to the investor that is sufficient to compensate for the credit risk associated with the investment. Floating rate bonds have usually been issued with high or low ceilings or variations in the interest rate. This is particularly important where statutory interest rate ceilings may come into play. Initially, floating rate bonds were sold with a relatively narrow spread between maximum and minimum limits. Investors currently demand an extremely wide spread or no maximum rate limitation.

Adjustable rate tender option bonds. A hybrid of the tender option bond and floating rate bond has been developed recently. The objective of the adjustable rate tender option bond is to effectively manage the refinancing risk and reduce or eliminate the cost of issuing new debt by preventing or postponing tender of the bonds by investors. The adjustable rate tender option bond technique provides for a repricing committee composed of representatives of major investment dealers. The purpose of this committee is to propose adjustments to the coupon rate on the tender bonds to a level deemed sufficient so that the tendered bonds can be remarketed to a new group of investors. The bonds remain outstanding and although the coupon rates are adjusted upwards or

Table 31

Alternative Long-Term Financing Techniques

Type of Bond	Maturity Range, years	Interest Rate, percent	Principal Advantages	Principal Disadvantages
Conventional	1-40	12.5-13	Simplicity Fixed costs Protects against water rate increases	Highest current rate but refundable
Tender option	20-30 nominal 3-5 year option	10-10.5 (adjustable after 5 years)	Lower rate in earlier years (2-2.5 percent) reduces capitalized interest Rate could decline	Refinancing risk--after option date, rate varies
Bond insurance	1-40	12.25-12.5	Lower rate (0.25-0.5 percent) Greater market access Improves secondary market	Cost of insurance Limited availability
Original issue discount	25-35	12.25	Lower rate (0.5 percent) appeals to different market segment	Issuer penalized unless call provisions are adjusted below par
Zero interest	15-35	11.5-12	Lower rate (1-2 percent) appeals to different market segment	Debt limitations may restrict use
Floating rate	5-30	11.5	Lower rate in current market	Unpredictable cost could exceed fixed rate alternatives Difficult to advance refund

downwards, the bonds are not refinanced. The object is to maintain lowest possible interest rate that will not prompt the investors to tender the bonds back to the issuer.

Bond insurance. Bond insurance is a technique for artificially increasing the credit worthiness of the issuer. The objective of obtaining bond insurance is to obtain an automatic AAA rating that will lower interest cost and expand access to the market. To qualify, a utilities bonds must be rated BBB or better by Standard and Poor's bond rating service. Bond insurance guarantees timely payment of principal and interest on the bonds. The bond issuer pays a one time premium, usually ranging between 0.6 and 1.5 percent of the total principal and interest due on the bonds. To evaluate whether the cost of insurance is beneficial, it is necessary to conduct a present-value analysis of the interest cost savings against the insurance premium. It should also be noted that insurance has enabled many lower rated or first-time issuers to gain market access or to sell bonds with lower maturities.

Original issue discount bonds. Original issue discount (OID) bonds are an attempt to take advantage of Federal tax law. If the bonds are sold at a discount (sold below par value), the return realized by the investor at maturity is not a capital gain but a payment or income in lieu of interest. Since interest is tax exempt, the difference between the discount price and par is also tax exempt. The OID bonds with a 50- to 60-percent discount from par provide the buyer with yields of about one fourth to one half of 1 percent less than bonds of comparable maturities priced at par. The OID bonds may also attract buyers who would not otherwise purchase long-term bonds.

Zero interest bonds. Zero interest bonds are the ultimate conclusion of the OID bond. Zero interest bonds substitute principal for interest. The investor foregoes current income in exchange for appreciation in the value of the bonds at maturity or when the bonds are called.

Stepped coupon bonds. Stepped or graduated coupon bonds are serial coupon bonds that all bear the same rate of interest for any one year. As each year passes from the date of issue to final maturity, the coupon rate for the remaining bonds increases gradually from year to year. The coupon rate never decreases. The interest rate is lower in the initial years resulting in substantial savings on projects for which interest is capitalized during the construction period. Call premiums, however, are usually very high to offset the investor's initial loss of income, and thus bond refunding may be difficult.

Bonds with warrants attached. Bonds with warrants attached are bonds sold with a warrant entitling the purchaser to buy an additional bond at the same coupon rate at any time within a 1-year period. If interest rates decline, the investor can exercise the option. If interest rates increase, the warrant expires since investors have an opportunity to purchase bonds at higher rates.

Financing constraints

Constraints to public utility financing through issuance of debt instruments are usually of two basic types: statutory constraints and marketability constraints. Statutory constraints are founded in the restrictions on the issuance of debt instruments commonly found in state laws. Marketability constraints result from market forces or the credit worthiness of the issuing entity.

Statutory constraints. The authority of a particular entity to issue debt instruments flows from the state to the entity. Numerous statutory constraints related to the issuance of debt are often imposed on the individual entities issuing the debt. Typical restraints may include interest rate limitations, time to maturity limitations, total indebtedness limitations, and requirements for referendums in the case of particular classes of debt. Indeed, the popularity of revenue bonds is a direct result of debt limitations often imposed on the issuance of general obligation bonds.

As discussed, most of the innovative/alternative financing techniques being proposed for public works financing attempt to shift some risk from the purchaser of the debt to the issuer. As a result, many of the new types of debt issues are not available under existing statutory constraints. Since the constraining statutes are different in each state, a separate review is necessary. A summary of this review for each state in the study area is contained in Appendices C through F of this report.

Marketability constraints. A discussion of marketability constraints is beyond the scope of this study. Several excellent publications discussing various aspects of the marketability of public works debt are available (Calvert 1972; Tinsley 1975; Nolan and Foran 1983). In many cases, particularly with small entities, a proposed debt issue is simply not marketable. The market feasibility of issuing debt must be evaluated on the merits of each particular entity and each specific proposal for issuance of debt.

In addition to strict marketability constraints (i.e., will anyone buy

the proposed issue?), it is important to note that virtually every existing water utility has been created, acquired, and constructed through previous financing issues now outstanding. The practical effect of these outstanding debt obligations is to superimpose on the statutory requirements additional constraints contained in the various bond indentures authorizing the previous financings. For example, while the various statutes authorizing financing for water utilities are usually silent on such matters as earnings requirements, bond indentures uniformly require maintenance of a debt-to-earnings ratio as a prerequisite to additional financing. Thus, in addition to maintaining statutory compliance, any technique for new financing must be reviewed and compared to the requirements of covenants of outstanding debt.

Expanded Assistance Programs

It is clear that the development of existing water utilities, particularly those for small municipalities and rural unincorporated areas, would have been severely hampered had local, state, and Federal agencies not supported their implementation through development of direct and indirect assistance programs. These assistance programs have been described in detail in Parts III and IV of this report.

The development of additional direct and indirect assistance programs has been proposed as a means of resolving both the urban and rural water supply problems facing the Nation. Various legislative proposals have been introduced at both the state and Federal level to provide additional assistance to local entities wishing to implement water utility improvement programs. These legislative proposals are generally directed at providing financial assistance for rehabilitation of the Nation's infrastructure to include water utility systems. As of 23 August 1983, 12 bills related to the water infrastructure had been introduced in the 98th Congress.* A summary of each of these is given below:

a. S. 23 "Rebuilding of America Act of 1983." This bill establishes a National Commission on the Rebuilding of America, composed of the Secretaries of Army, Commerce, and Transportation, among others. The Commission is to conduct an inventory of the condition of major public improvements in the United States and to develop a 10-year

* Personal Communication, 1983, Mark Mugler, Institute for Water Resources, Fort Belvoir, Va.

investment plan for public improvements. The Corps of Engineers is to house the Commission and to direct the commission staff.

b. S. 266 "Community Renewal Employment Act." This bill authorizes the Secretary of Labor to provide grants to high unemployment communities to employ long-term unemployed individuals in renovation and repair of facilities, including: water systems; drainage improvements; erosion, flood, and drought related works; and stream, lake, and waterfront improvements.

c. S. 523 "Public Investment Incentive Act of 1983." This bill creates a National Infrastructure Council. The Council is to provide funds to State Infrastructure Banks (i.e. state bond banks) for the purpose of establishing in each state a revolving infrastructure loan fund. This enables the diversion of Clean Water funds to the state banks. The model for S. 532 is the New Jersey Infrastructure Bank.

d. S. 676 "A Bill to Provide for Capital Assistance to State and Local Governments." This bill establishes a State and Local Capital Assistance Trust Fund. The Secretary of Treasury is to distribute funds for facility construction and rehabilitation, including port, river, and inland water facilities and facilities for the storage, transportation, treatment, or distribution of water.

e. S. 1330 "A Bill to Authorize the Corps of Engineers to Provide Grants to Several States to Encourage and Foster Construction of Necessary Public Capital Investment Projects and for Other Purposes." This bill authorizes $5 billion per year in matching grants for infrastructure projects.

f. S. 1739 "Omnibus Water Bill." *This bill resembles H.R. 3678 but does* not provide for a water supply loan program.

g. H.R. 565 "A Bill to Establish a National Ground Water Commission and for Other Purposes." This bill establishes a 17-member commission, to be terminated 1 January 1986, to submit a report to Congress analyzing the extent of groundwater contamination caused by hazardous and other solid waste, the regions and major water supplies most significantly affected by such contamination, and any recommendations of the commission for prevention or remedial measures to protect human health and the environment from the effects of such contamination.

h. H.R. 1036 "Community Renewal Employment Act." An expanded version of S. 266, this bill includes titles for community renewal employment programs, educational facility repair and renovation employment activities, and definition of state employment service responsibilities.

i. H.R. 1244 "Federal Capital Investment Budget of 1983." This bill requires the President's budget to separately identify and summarize Federal capital investment expenditures, and to contain an analysis of capital investment needs.

j. H.R. 2544 "Emergency Public Works Employment Act of 1983." This bill authorizes the Treasury Department to provide grants to municipalities for short-term infrastructure. The bill gives $2.4 billion to states and municipalities according to an unemployment-based formula. Local match is required if a community's unemployment rate is less than state average. The bill also gives $800 million to communities

according to a general revenue-sharing program. The percent local match is based on unemployment rate.

k. H.R. 2865. This bill provides state grants for short-term infrastructure repair and increases construction grant authorization under the Clean Water Act.

l. H.R. 3678 "A Bill to Provide for the Conservation and Development of Water and Related Resources and the Improvement and Rehabilitation of the Nation's Water Resources Infrastructure." This is an omnibus water resources bill authorizing $12.4 billion in new Federal programs and projects. Under Title 8 of H.R. 3678, the Army Corps of Engineers would implement an $800 million-per-year water supply loan program to back water system repair, rehabilitation, and expansion. No state would receive more than $80 million annually under the loan program, and each project would face a $40 million annual loan cap. Loans would be limited to 80 percent of project costs, except in isolated rural areas where greater Federal funding may be necessary. Water supply loans will be channeled to projects designed to correct pollution or contamination problems. Technical assistance to public water supply systems also is available under the program. In addition, H.R. 3678 requires the Corps of Engineers to prepare a 10-year capital budget for Civil Works and to study and report on the Nation's municipal and industrial water supply needs.

Types of assistance programs

The legislative initiatives can usually be classified into one of five broad programs, including the following (Institute for Water Resources 1980):

a. Direct financial assistance without restrictions.

b. Direct financial assistance with restrictions.

c. Legislative change without funding.

d. Bond or water banks.

e. Continuation of existing policies.

It should be noted that although numerous assistance programs have been proposed, there appears to be no broad mandate for creation of any new assistance programs. Recent discussions at the Federal level of the need for a new program to finance the replacement of deteriorating water distribution systems seems headed nowhere, having been opposed by both the General Accounting Office and the American Water Works Association (Grigg and Hanke 1982).

Direct financial assistance without restrictions. In some situations, it is believed that only direct financial assistance will resolve problems related to the access to capital funds. The underlying principle of unrestricted direct assistance is that the local authority is best able to allocate the financial resources and therefore should not be constrained in their use. Two frequently cited difficulties in this approach are in distributing resources

equitably, and in measuring the success of such a program. Any of the following elements might be included in a direct assistance without restrictions approach:

a. Direct grants.

b. Direct loans with or without subsidized interest rates.

c. Debt service grants.

d. Loan guarantees.

e. Planning grants.

Direct financial assistance with restrictions. The program proposal for direct assistance with specific restrictions is similar to the direct assistance without restriction program. The restricted assistance approach provides for the needed financial assistance and at the same time recognizes that many of the water utility problems are the result of a utility's internal institutional problems.

Any of the elements listed above as direct assistance programs might be incorporated into a restricted direct assistance program. The potential restrictions on each of the above identified elements that may be incorporated in the restricted direct assistance program include the following:

a. Financial regulation.

b. Rate setting practices.

c. Quality regulations.

d. Resource management.

e. Management training.

f. Operator training.

Legislative change without funding. Fiscal stability and policy are often cited as major areas of concern in the implementation of a water utility project. It is possible to address these and other issues through nonfunding legislation. For example, areas receiving other financial assistance through existing programs could be required to develop a water supply management plan which considers each of the four basic vital conditions previously discussed.

The array of possible legislative changes is extremely broad and the change could be made to any existing program. The purpose of the change would be to shift the basic intent of existing legislation to reflect the heightened concern for water supply issues. One such legislative change, however, would not constitute an adequate solution to the numerous and diverse water supply problems facing both urban and rural areas. Further, the overall problem of

accessibility to capital markets would not be resolved. Any of the restrictive elements listed in the restricted direct assistance program might be incorporated into legislative changes to existing programs.

Bond or water banks. One of the more popular proposals for increased assistance to water utilities is the establishment of a Federal or state water or bond bank. The primary objective of the water bank is to reduce the financing costs associated with obtaining capital. A bond bank enables local government units to market their bonds at a reasonable cost. A bond water bank could be empowered to issue bonds and notes in its own name and/or borrow directly from the U.S. Treasury. The proceeds from such activities would be used to purchase the bonds and notes of local government units.

A water bank would be a semiautonomous arm of either the Federal or state government, with limited intervention by the bank in the day-to-day operation of the water utility system. Eventually, it is anticipated that the bank could achieve self-sufficiency, removing the need for continued government support. The water bank could increase the access to capital markets for those systems with problems in that area. The bank would likely have a better credit rating than the individual water system, thus lowering the interest rate paid by the utility.

Although the water bank will provide direct assistance to those utilities with capital market access problems, utilities facing internal system management problems will not be helped unless the local authorities decide to use portions of the bond monies for this purpose. In general, bond banks would have a limited capability to impact problems associated with water system management. A water utility could use monies borrowed from the bond bank to address these management problems; however, there is no guarantee that this would occur unless restrictions were imposed. Restrictions may include any of those elements discussed under the direct assistance with restrictions program.

Although the water bank concept has received strong support, Hanke (1981) argues that such an entity would distort credit allocation mechanisms in favor of water utilities at the expense of private borrowers and taxpayers. As a result, the resources may be diverted from more productive uses.

Continuation of existing policies. One alternative for dealing with water supply problems is the option for continued reliance on existing programs and policies. As discussed previously (Part III), several Federal and state

programs presently exist for assisting water supply utilities. Funding for these programs could be increased as required to meet capital needs.

The largest single program, that of the Farmers Home Administration, provides grants and loans to local entities for development of water utilities. These funds are limited to communities with populations of less than 10,000; hence, they do not apply to larger municipalities or urban water suppliers. None of the other programs identified have primary orientation towards water supply. Aimed essentially at assisting economically depressed areas, these programs have traditionally allocated only a small percentage of funds to water supply.

The effect of continuing existing programs with additional Federal, state, or local programs will be largely to require the individual water systems to function independently. Gaps will remain in the assistance programs and the water utility systems will have to individually overcome the physical, institutional, and financial barriers which contribute to their present condition.

Program elements

Each of the five broad programs includes a series of program elements. These elements, described briefly below, are presented as either financial or management elements.

Financial elements. Potential elements resulting in a financial impact include the following:

a. Water bank. This element, described in detail in the section describing basic program alternatives, provides a dedicated source of funds for water supply.

b. Federal construction. Water resources projects developed by the Corps of Engineers are examples of Federal construction programs.

c. Direct assistance. Programs which provide direct assistance are revenue subsidies in content and purpose. These include direct grants, direct loans, subsidized interest rates, debt service grants, loan guarantees, and planning grants. The FmHA grant and loan program and the USEPA Construction Grants program are examples of direct assistance programs.

d. Planning assistance. Although typically a grant program, this type of assistance is a hybrid element which directly impacts management. The planning assistance element could be the first part of a construction grant program, or could stand alone as basic resource management.

e. Allocation program. Federal assistance programs are usually

allocated at the state level. Restrictions on funding can be applied at this level, and allocation within the state can focus support on specific problem or geographic areas.

f. Rate setting. The rate setting process can be used to establish or support policies. The standard of evidence in support of a rate structure could be tied to the need for revenues adjacent to ensure system viability. This could be accomplished through legislative change.

g. State construction. State legislatures could authorize and allocate funds for water supply purposes in a fashion similar to Federal programs.

h. Financial regulations. States have the capacity to control the financial environment of local units of government. Balanced budget restrictions and debt ceilings are examples of these controls. Standards for developing and/or maintaining adequate rate structures could be established through use of these authorities.

Management elements. Potential program elements that impact on the management function include the following:

a. Regulatory programs. Both Federal and state governments have the authority to regulate local water suppliers. Management priorities such as operator training or planning can be required through these measures.

b. Federal planning. Federal planning can be instituted through existing or new programs which will respond to source and conservation issues. This is an area which has not achieved broad attention at any level of government.

c. Technical assistance. There are several assistance programs which could be brought to bear on the urban water supply issue. These include development of operation and training and public participation programs, as well as engineering or rate setting assistance.

d. Basic data and research. Basic data and research will support capital investment programs, rate setting, and management decisions such as frequency of distribution system replacement or new source development.

e. Federal project management. The Federal Government could design, build, and/or operate water supplies, taking the financial burden of these functions off the local governments altogether.

f. Court/agency arbitration. In water-scarce areas where there is interstate adjudication of water rate issues, a Federal agency could replace the courts as arbitrator of water rights issues, thereby ensuring a more centralized and unified national water allocation.

g. Resource management. The importance of resource management has been highlighted in this report. Progress at the state level tends to coordinate resource development, and could ensure the most efficient allocation of rare water resources.

h. Water law/allocation. Historically, water law and allocation have

been state prerogatives. These functions could be reviewed and refocused to support resolution of urban problems.

i. Training. Both management and operator training are essential to the viability of a water utility.

These elements can be combined into a number of broad assistance programs, depending on the final focus and intent of the proposed water assistance package. Table 32 illustrates how these individual program elements could be integrated into the five broad programs discussed above.

Table 32

Integration of Program Elements into Program Forms (From Institute for Water Resources 1980)

Potential Program Elements	Direct Assistance Without Restrictions	Direct Assistance With Restrictions	Legislative Change Without Funding	Bond or Water Banks	Continuation of Existing Policies
Financial					
Water bank	X			X	
Federal construction	X	X			
Direct assistance	X	X			
Planning assistance	X	X		X	X
Allocation program		X	X	X	
Rate setting		X	X	X	
State construction	X	X			
Financial regulation		X	X	X	
Management					
Regulatory programs		X	X		X
Federal planning		X	X		
Technical assistance	X	X	X		X
Basic data and research	X	X	X		X
Federal project management		X	X		
Court/agency arbitration		X	X		
Resource management		X	X		
Water law/allocation		X	X		X
Training	X	X	X		

PART VI: SUMMARY

Implementation of a water utility project may range from a limited extension of a water main to provide service to a new area, to formation of a large regional water system serving thousands of customers. Project implementation involves expertise including engineering, legal, and financial considerations. In addition, those wishing to implement such a project must be aware of available organizational structures, regulatory interfaces, and sources of assistance. This report should not be construed as an attempt to replace those persons with the required technical expertise to implement such projects; however, it is designed to provide a review of basic background material to the water utility lay person.

Technical Arrangements

Technical arrangements for implementation of a water utility project are usually the responsibility of the engineer. The engineer may be obtained from in-house resources or, as is the more general case, retained from outside sources such as a consulting engineer. The engineer is responsible for conducting studies, developing plans and specifications, and general supervision of construction. The engineer may also participate in discussion with legal and financial advisors in development of the financial feasibility analysis for a specific project. Part II of this report describes in detail the engineering aspects of water utility project implementation.

Institutional Arrangements

The institutional considerations associated with implementation of a water utility project include defining the organization structure, defining regulatory interfaces, and identifying sources of technical assistance. Part III of this report provides a detailed analysis of these aspects of water utility project implementation.

A variety of organizational structures are currently available for persons wishing to implement a water utility project. These available arrangements include both private and public ownership concepts and range from the sole proprietorship private company to the regional authority composed of

numerous governmental entities. The authority for implementing a water utility project flows from the state and must satisfy available statutory provisions. Each state within the study area provides similar yet somewhat different mechanisms for implementing water utility projects.

Often, it has been found that the real constraint to water utility project implementation is not the lack of available institutional alternatives but the lack of political or social will to make use of available alternatives. Local community pride often enters into the evaluation of institutional options. In the past, every community wished to own and operate its own water utility. As the cost of providing water has increased, communities have expressed a willingness to cooperate in ways that were previously unacceptable. Thus, in recent years, regionalization and consolidation of functions have become more common. This trend is expected to continue in the near future.

A universal, generalized institutional solution for implementing a water utility project cannot be developed. The nature and exact scope of the institutional arrangement selected for implementation must be based on local factors that incorporate technical, financial, political, and social considerations.

In those cases where existing statutory arrangements are either inadequate and/or unacceptable, those wishing to implement a water utility project always have the option of lobbying for special statutory authority from the various state legislatures. Such special authority can be designed to include those functions and attributes desired by the local population.

Three innovative/creative organizational structures, including regionalization, consolidation/coordination, and privatization, were identified during this study. Each of these is discussed in detail in Part V of this report. Regionalization and the less formal consolidation/coordination options have been available but little used for some time. Economic considerations are now making both options more attractive to the small utility.

Institutional arrangements for water utility project implementation include not only development of an organizational structure, but consideration of regulatory agencies and sources of technical assistance. Since these concerns are primarily a government function, the source and nature of information concerning these matters vary from state to state within the study area. Part III of the report details those agencies and/or organizations in each

state having a regulatory or technical assistance function.

Financial Arrangements

Financing of water utilities is a critical function of management and is often the driving force behind selection of an appropriate organizational structure for a water utility. Traditionally, water utility projects have been financed through either issuance of debt or direct financial assistance from state and Federal government programs. A variety of financing techniques are available to water utilities in the various states within the study area; these techniques are generally oriented towards long-term fixed rate financing through issuance of bonds. These traditional financing techniques are described in detail in Part IV of this report.

As a result of recent uncertainty in the municipal bond market, a number of innovative/creative financing techniques have been developed. In general, these techniques tend to shift the burden of risk from the bond buyer to the bond issuer. These techniques are discussed in detail in Part V of this report.

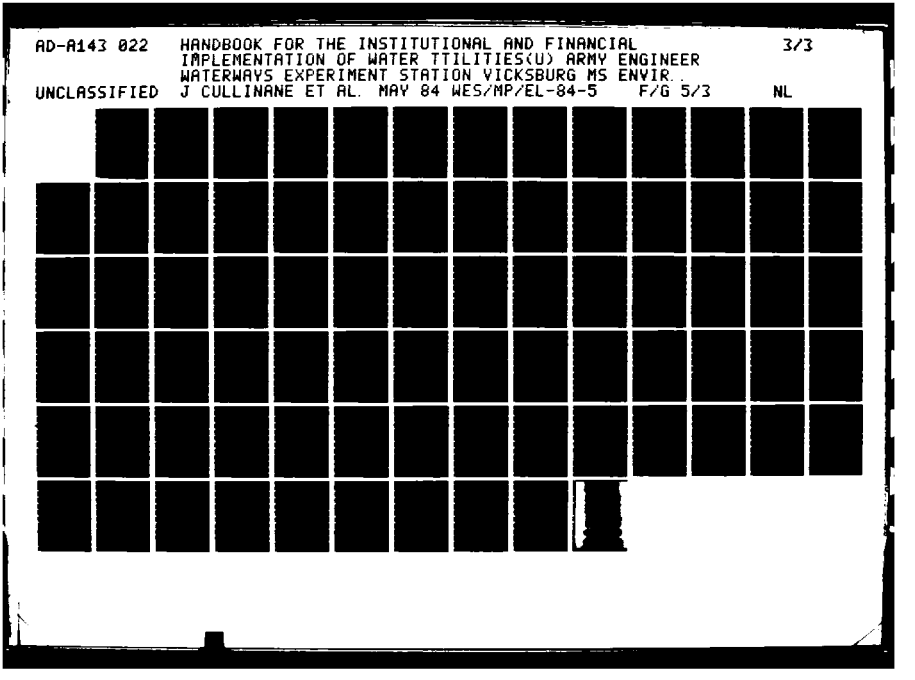
The ability to issue debt to finance water utility projects is controlled by both statutory and market constraints. Since the authority to issue debt must come from the state statutes, many of the innovative/creative financing techniques identified during this study are not available in the states within the study area. If any of these unauthorized techniques are deemed desirable for a given situation, appropriate changes to state statutes must be made. These changes can only be made by the respective state legislatures. An analysis of statutory constraints on the use of these techniques in each state within the study area is presented in Appendices C through F of this report. Regardless of statutory authorities, many entities are unable to issue debt because of marketability. Many entities are unable to sell bonds at any rate; thus, their financing options are limited to assistance programs such as that provided by the Farmers Home Administration.

Several state and Federal financial assistance programs were identified during this study. These are discussed in Part IV of this report. Many of these programs are oriented towards economic development rather than water utility project implementation. As a result, a water utility project would have to meet very specialized criteria in order to qualify for assistance.

Several Federal legislative initiatives have been identified that would greatly expand Federal assistance programs. At the present time, these initiatives remain proposals and may be found in various states of the legislative process. The types of expanded programs being proposed are categorized and discussed in Part V of this report.

As in the case of developing institutional arrangements, a universal financial arrangement scenario cannot be developed. Local, project-specific or utility-specific conditions dictate the choice of the best financial option available for a project or a utility. Development of the appropriate financial option is the responsibility of the water utility in consultation with engineering, legal, and financial advisors.

There is usually a wide variety of technical, institutional, and financial options available for implementation of a water utility project. Community leaders, working with the people to be served by the water utility, can generally solve problems within the existing framework. In some cases, it may be necessary or advisable to implement a water utility project based on the use of one of the innovative or creative techniques presented in this report. There is no panacea to solve all problems associated with water utility project implementation. The information presented in this report, however, should assist the lay person in interacting with community leaders and decisionmakers and help to ensure that selected alternatives meet community objectives for an adequate water supply.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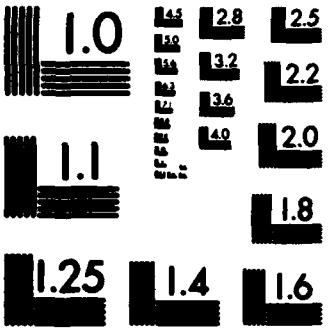

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APPENDIX A: GUIDELINES FOR THE CONTENTS OF A PRELIMINARY ENGINEERING REPORT

PRELIMINARY ENGINEERING REPORT
FOR A WATER FACILITY

I. GENERAL. The following may be used as a guide for the preparation of Preliminary Engineering Reports for water systems financed by the Farmers Home Administration.

A. Area to be served. Describe--give natural boundaries, major obstacles, elevations, need for facility, and other pertinent information. Use maps, photographs, and sketches.

B. Existing facilities. Describe--include condition, suitability for continued use of facilities now owned by the applicant, adequacy of water supply, storage, and distribution facilities. Give financial status of existing water facilities--including rate schedules, annual operating cost, tabulation of users by monthly usage categories, and revenue received for latest fiscal year. Give status of existing debts and required reserve accounts.

C. Proposed facilities and services.

1. General description of proposed facility, including design criteria adopted. Include discussion of possible alternates.

2. Land--include amount required, location, and alternate locations.

3. Rights--include easements, permits, and other evidence of rights-of-way required; availability of alternates, State Health Department and other agency requirements.

D. Proposed system.

1. Water supply. Include requirements for quality and quantity.

a. Sources--include study on all feasible sources and provide comparison of such sources.

b. Treatment--requirements, if any, and proposals.

c. Storage--requirements and proposals.

d. Pressure--requirements and proposals.

e. Distribution systems. Requirements and proposals - give lengths and sizes; key features.

f. Hydraulic calculations in tabular form.

E. Cost estimate. Include development and construction, land and rights, legal, engineering, interest, equipment, contingencies, refinancing, and other. (For projects containing both water and waste disposal systems, provide a separate cost estimate for each system.)

F. Annual operating budget.

1. Income--include rate schedule. Project income realistically. In the absence of other reliable information, base water use on 35 gal per capita per day, or 140 gal per family per day, or 4200 gal per meter per month. When large livestock users are projected, the report must include facts to substantiate such projections.

2. Operation and maintenance costs. Project costs realistically. In the absence of other reliable data, base on actual costs of other existing facilities of similar size and complexity. Include facts in the report to substantiate operation and maintenance cost estimates. Include salaries, wages, taxes, accounting and auditing fees, legal fees, interest, utilities, gasoline, oil and fuel, insurance, repairs and maintenance, supplies, chemicals, office supplies and printing, and miscellaneous.

3. Capital improvements.

4. Debt repayments.

5. Reserve. Unless otherwise required by state statute, establish at one tenth of annual debt repayment requirement.

G. Maps, drawings, sketches, and photographs.

1. Maps--show locations, boundaries, elevations, population distribution, existing and proposed systems, rights-of-way, and land ownership.

2. Drawings, sketches--show preliminary design and layout elevations.

3. Photographs--as needed.

H. Construction problems. Discuss in detail, include information on items such as subsurface rock, high water table, or others which may affect cost of construction or operation of facility.

I. Conclusions and recommendations.

APPENDIX B: HYPOTHETICAL FINANCIAL FEASIBILITY ANALYSES

Hypothetical Example 1

Background

Hypothetical example 1 illustrates financial feasibility analysis for the development of a new water utility for Shaferville using a Farmers Home Administration grant and loan for partial payment of capital costs associated with the project. For purposes of this example, it is assumed that a grant for 10 percent of costs will be obtained, the interim financing rate is 9 percent, and the long-term financing rate is 10 percent.

Area description

The Shaferville Community (a hypothetical community) is located on the State Aid Highway connecting Smithville with U.S. Highway 82. Residents of the area make their living in farm enterprises and by public work in surrounding communities. The proposed service area contains approximately 150 potential water customers consisting of rural residences, churches, a store, one poultry unit, and a hog farm. Residents of the area obtain water from privately owned shallow wells, springs, and cisterns, or else they haul water. The existing water supplies vary in quality and quantity. None of the existing facilities are to be used in the proposed water system.

Proposed facilities

The water system proposed for the Shaferville Community is designed to serve the current needs of the residents of the community with a 20-percent allowance for capacity expansion.

Water supply. A review of geohydrologic records maintained by the U.S. Geological Survey indicates that groundwater resources in the area are sufficient to provide water in adequate amounts and quality for the total requirements of the community. A 6-in.-diam, 150-gpm well is proposed as a source of supply for the system. A deep well, vertical turbine pump, with a rated capacity of 150 gpm at 20 psi will be furnished with the well. The electric motor will be 220/240 volt, three-wire, three-phase, alternating current, 60 cycle.

A test well will not be used since records of nearby wells indicate that an adequate supply of water is available at a depth of approximately 1000 ft.

Treatment. Records from nearby wells in the aquifer to be developed indicate that water treatment other than chlorination will not be required.

Storage. Preliminary design indicates the need for a 40,000-gal

standpipe storage tank for the system. The storage tank design is based on 1-day supply holding capacity.

Distribution. Four-inch-diameter polyvinyl chloride (PVC) (SDR21) water mains supplemented by 2-, 2-1/2, and 3-in. PVC laterals are proposed for the distribution system. Minimum pressure at any point in the system will be 20 psi. Pressure reducing valves will be used to keep maximum pressures below 80 psi. Water lines will be located in county road rights-of-way or in easements obtained by the water utility. Each customer will be served at his property line by a connection through a meter connected to the water main by a service line.

Land, right-of-way, and easements. A lot approximately 100 ft by 100 ft in size will be required for the well, pumps, treatment plant (if required), and storage tank. The water utility must obtain permission to locate water mains in the rights-of-way of county roads and easements from property owners before locating water mains on private property.

System costs

Capital costs. Direct and indirect construction costs associated with the distribution system are summarized in Table B1. These costs have a July 1983 base. Total estimated cost for the proposed water system is summarized in Table B2.

Operating and maintenance costs. As a new system, no records are

Table B1

Estimated Distribution System Costs for the Shaferville Community Water System

Item	Quantity	Unit	Unit Price, $	Total Cost, $
4-in. PVC water main	22,000	L.F.	1.60	35,200
3-in. PVC water main	35,000	L.F.	1.20	42,000
2-1/2-in. PVC water main	5,000	L.F.	1.10	5,500
2-in. PVC water main	15,000	L.F.	0.90	13,500
Valves, fittings, and meters	1	L.S.	30,000	30,000
Bored steel casing (4 in.)	300	L.F.	10.00	3,000
Misc. const. items	1	L.S.	5,000	5,000
				$135,000

Table B2

Estimated Project Cost for the Shaferville Community Water System

Item	Cost, $	
Direct construction cost		
Well, pump, motor, controls	50,000	
Storage	36,000	
Distribution system	135,000	
Construction contingency (15%)	30,000	
Subtotal direct construction		251,000
Indirect construction cost		
Engineering (10%)	25,100	
Inspection (5%)	12,550	
Rights-of-way and land acquisition	3,000	
Legal fees (3%)	7,500	
Administration (1%)	2,500	
Subtotal indirect construction		50,650
Fiscal costs*		
Interim financing (1 yr @ 10 percent)		20,000
Capitalized interest (2 yr @ 10 percent)		40,000
Subtotal fiscal costs		
Project contingency (5%)		18,000
Total estimated project cost		$379,650

* Assumes $100,000 Farmers Home Administration (FmHA) grant.

available for analysis of operation and maintenance costs. Analysis of the operation and maintenance costs of well-operated, similar-sized systems indicates the operation and maintenance costs tabularized in Table B3.

Table B3

Estimated Operation and Maintenance Costs

Shaferville Community Water System

Expense Category	Cost/Month/Connection
Supervision & management	1.00
Billing & collecting (includes meter reading)	2.00
Distribution system maintenance	1.74
Well operating costs	2.50
Miscellaneous costs	1.00
Total monthly operation & maintenance cost	$8.24

Debt service. Debt service is calculated on the basis of a 10-percent FmHA loan in the amount of $279,650 for construction of the system. This assumes a FmHA grant of approximately $100,000. Assuming a 35-year bond maturity, the annual repayment requirement is approximately $29,000. In addition to the base repayment, FmHA requires that a 10-percent reserve account be established. Reserve collection requirements would be approximately $2900 per year.

Total annual costs. Total annual cost per customer are tabulated as follows:

Operation and maintenance	$ 98.88/year
Debt service	$227.86/year
Total	$326.74/year

System revenues

Revenue or income from the proposed system is based on the number of customers served and the anticipated water usage by each customer. There are 150 potential customers within the proposed service area, of which 140 have indicated a desire to receive service from the system. Based on the initial survey of the proposed service area, anticipated water usage has been projected. Anticipated water usage is presented in Table B4.

For ease of calculation, it is assumed that the user charge system will use a constant rate structure, i.e. the consumer is charged at a constant rate

Table B4

Anticipated Water Usage for Shaferville Community Water System

Type Customer	Potential Customers	Immediate Customers	Potential* Water Sales	Immediate* Water Sales
Residential	145	135	942,500	877,500
Poultry unit	1	1	100,000	100,000
Hog farm	1	1	50,000	50,000
Store	1	1	6,500	6,500
Churches	2	2	2,000	2,000
Total	150	140	1,101,000	1,036,000

* Gallons per month.

regardless of water usage. The total annual system cost is estimated to be approximately $45,743. Total annual sales are estimated to be 12,432,000 gal. Thus, the cost of water can be calculated to be approximately $3.68 per thousand gallons. The average monthly bill for a residential customer using 6500 gal per month would be $23.92.

Financial feasibility

The financial feasibility of the proposed system is determined by the ability or willingness of the prospective customers of the system to pay the anticipated charges. If the system is not financially feasible under the assumptions and conditions presented, the proposed project must either be scaled down or additional grant monies obtained.

Hypothetical Example 2

Background

Hypothetical example 2 illustrates a financial feasibility analysis for the development of major system improvements to an existing water utility. For purposes of this hypothetical example, it is assumed that the system is a municipal system eligible for participation in the Community Development Block Grant Program and the Farmers Home Administration grant and loan programs.

The example presented here is a simplified version of a financial feasibility analysis. In actual practice, it may be desirable to attempt to

develop a 20-year cash flow analysis. However, for a small system with a relatively slow growth rate, such a detailed analysis may not be necessary.

The costs, grant amounts, and interest rates used in this analysis are hypothetical and are not represented as current costs applicable to system construction. The intent of this example is to illustrate the thought processes in a financial feasibility analysis.

Area description

The City of Jonesville, a hypothetical municipality of approximately 6500 people, owns and operates a water utility as a part of its municipal services. The municipal water system has approximately 1200 customers. The utility has been in operation for approximately 10 years and maintains reasonably adequate records of expense and water consumption. The municipality is contemplating major system expansion and improvements that involve the construction of additional storage and distribution facilities, additional source development, and modernization of existing equipment.

Proposed facilities

The proposed facility expansion and improvements have been divided into six separate projects. These individual projects, listed below, can be implemented individually or in any combination:

a. Project I: 300,000-gal elevated storage tank.

b. Project II: 500-gpm well.

c. Project III: water transmission mains.

d. Project IV: fire flow supply mains.

e. Project V: water distribution mains.

f. Project VI: system equipment modernization.

Self-generated revenue is not sufficient to finance construction of the proposed improvements. After contacting several commercial lending institutions, it has been concluded that there is no commercial market for the municipality's bonds for system improvements. Preliminary meetings with the appropriate state agencies and the Farmers Home Administration (FmHA) indicate that there is a high probability that the municipality can obtain a Community Development Block Grant of $200,000 for system improvements, a 65-percent FmHA grant, and a FmHA loan for the remainder of the required capital. The financial feasibility analysis is based on these funding sources.

System costs

Capital costs. The estimated costs for the proposed system improvements

have been extracted from the preliminary engineering report and are presented in Table B5.

Operation and maintenance costs. The municipality attempts to maintain accounting records so as to reflect operation and maintenance costs in categories that can be related to functional areas in order to evaluate operation and maintenance costs. The accounts are audited annually and the latest three audit reports are used as the basis of the evaluation of operation and maintenance. During the cost analysis process, it was discovered that the method of record keeping did not properly allocate certain expenditures to the appropriate functional areas. Some judgment was necessary in properly allocating costs into the functional areas used in this study. Typical problem areas included the following:

a. The expense involved in transportation, equipment depreciation, and payroll burden could not be readily allocated because of a weakness discovered in the accounting system.

b. The intermingling of labor and equipment effort and comingling of parts and supplies between repairs to the existing system and support of a force account construction program makes it difficult to allocate expense to the proper accounts.

c. The billing cycle complicates an exact allocation of costs between functional categories.

The categories of expense and the estimated expense allocation for the last fiscal year are presented in Table B6.

Operation and maintenance cost for the system is expected to track the inflationary trends of the general economy. An allowance for a 5 percent per year increase in operation and maintenance cost is considered prudent. The municipality also wishes to initiate a reserve fund for vehicle and equipment replacement and a contingency for out-of-ordinary maintenance and repair. The overall allocation of operation and maintenance expense for the next fiscal year is presented in Table B7.

System revenues

Revenue accrues to the water utility from the sale of water to consumers, fees for connection to the system, installation charges, fire protection charges, meter deposits, and special assessments.

Revenue from sale of water. Revenue accrues to the water utility from the sale of water to consumers connected to the system. Roughly 38 percent of the connected consumers using less than 12,000 gal of water per month are included in the group of consumers paying the minimum service charge of $7.00

Table B5

Summary of Project Costs

Cost Element	Project I	II	III	IV	V	VI	Total
Development	$270,000	$117,000	$350,000	$390,000	$170,000	$16,000	$1,313,000
Land and rights	6,000	3,000	17,000	4,500	2,200		32,700
Legal services	1,800	900	2,750	2,650	1,300	1,000	10,400
Engineering services							
Fee	17,820	7,800	23,000	25,800	11,400	960	86,780
Resident inspection			11,500	13,000	5,700		30,200
Other eng. cost	2,480	300	1,000	1,000	1,000	240	6,020
Subtotal	20,300	8,100	35,500	39,800	18,100	1,200	123,000
Equipment						41,000	41,000
Contingencies							
Construction	27,000	13,000	35,000	40,000	20,000		135,000
Project	6,650	3,000	8,000	10,300	4,000	2,300	34,250
Subtotal	33,650	16,000	43,000	50,300	24,000	2,300	169,250
Client administration	1,250	1,000	1,750	1,750	1,400	300	7,450
Interest							
During construction	14,500	4,000	20,000	18,500	8,000	1,000	66,000
Capitalized	11,000	4,500	15,000	16,000	7,000	6,500	60,000
Subtotal	25,500	8,500	35,000	34,500	15,000	7,500	126,000
Estimated total cost	$358,500	$154,500	$485,000	$523,500	$232,000	$69,300	$1,822,800

Table B6

Allocation of Estimated Operation and Maintenance Expense for Last Fiscal Year

Expense Category	Expense	Cost Per Unit
Supervision and management	$25,000	$20.58/customer/year
Billing and collection	$26,000	$21.67/customer/year
Plant operation and maintenance	$10,500	$0.07/1,000 gal
Distribution system operation and maintenance	$ 7,500	$200/mile/year
Power and chemicals	$16,100	$0.11/1,000 gal
Total	$85,100	

Table B7

Expense Projection for Next Fiscal Year

Expense Item	Projected Expense
Last fiscal year operation and maintenance	$ 85,100
Escalation (5%)	4,255
Vehicle and equipment replacement reserve	10,000
Contingency operation and maintenance reserve	8,000
Estimated total annual operation and maintenance	$107,355*

* For purposes of the financial analysis, use $108,000.

per month. These consumers use less than 3000 gal of water per month. About 32 percent are included in Category I which is the group using more than 3000 but less than 6000 gal of water per month. About 15 percent of this group are Category II consumers using more than 6,000 but less than 12,000 gal per month. Consumption allocations are tabulated in Table B8.

A charge of $5.50 per residential unit such as a mobile home or apartment is collected for each master meter installation. The amount of revenue accruing to the utility for the sale of water is shown in Table B9.

Revenue from the sale of water is pledged to operation and maintenance of the water system and for debt service on the long-term debt of the system.

Revenue from connection fees. Consumer's connection fees are assessed to

Table B8

Consumption Allocation by Category of Use

Category of Use gal	%	Number of Consumers	Connected in June/July 1978	%	Water Use/Month
0-3000	20	240	268		
Master meters	20	240	188		
3,001-6,000	35	420	321	27	2,700,000
6,001-12,000	15	180	275	20	2,000,000
12,001-17,000	5	60	65	9	900,000
17,001-24,000	2	25	34	6	600,000
24,001-100,000	2	25	34	13	1,300,000
Over 100,000	1	12	15		2,500,000
Totals	100	1,200	1,200		10,000,000

Note: The sale of 10,000,000 gal of water per month is used in determining income whereas 12,000,000 gal of water used per month is used in determining the amount of water pumped because of system losses.

Table B9

Probable Average Billing Per Month for Next Fiscal Year

Category of Consumer	Size of Meter* in.	Number of Consumers	Average Consumption gal	Billings Per Rate	Adjusted Billing**	Probable Revenue
0-3,000	3/4	245	Min.	$ 7.00	$ 7.00	$ 1,715
Master Meter	---	245	5,000	5.50	5.50	1,347
3,001-6,000	3/4	429	4,000†	8.00	8.00	3,432
6,001-12,000	3/4	184	8,000	10.60	10.50	1,932
12,001-17,000	3/4	61	15,000	14.80	15.00	915
17,001-24,000	1	25	20,000	22.80	23.00	575
24,001-100,000	1-1/2	25	50,000	52.80	50.00	1,250
Over 100,000	2	13	200,000	154.80	150.00	1,950
Total		1,225				$13,116

* Usual installation.

** For purposes of this study.

† Consumption records indicate a use of 5,000 gal per month in this category but this use is reduced in this analysis in order to more closely conform to actual collections.

consumers joining the utility mains abutting their property. A developer's connection fee is charged to each developer constructing a distribution system serving more than five individual residences or equivalents thereof located on separate premises. This charge of $125.00 per unit is intended to reimburse the utility for each consumer's prorata part of the supply, storage, and distribution network supporting service to the consuming unit.

Consumer connection fees are used to defray the expense of connecting additional consumers to the system and developer's connection fees are used to help defray the expense of debt service on the long-term debt.

Installation charges. The utility's in-house forces are, from time-to-time, requested to install relatively short extensions to mains, out-of-the-ordinary connections, etc., for which services the utility is reimbursed by the property owner being served.

Fire protection charges. The utility has installed a substantial amount of elevated storage and large water mains in an industrial service area. Additional revenue accrues to the utility from charges assessed for these services. Revenues for fire protection are pledged to debt service for the fire protection bonds issued for constructing these facilities.

Meter deposits. Meter deposits, as such, are not considered as revenue until such time as the deposit is used to reimburse the utility for a delinquent account. Interest earned on invested meter deposits is considered as revenue.

Special assessments. Special assessments upon benefited property are utilized on a project-by-project basis to fund construction of water mains being installed for the development of unimproved property. The assessments are levied, collected, and disbursed to debt service accounts for each specific project and are considered as being separate and apart from other system revenues.

Funding plan

Funds required for improvement program. The funds necessary to implement the capital improvements program are shown in Table B10. The funding plan includes the anticipated $100,000 from Community Development Block Grant (CDBG) Program funds and a 60-percent FmHA grant, with the remainder of required funds obtained through issuance of bonds to be purchased by the FmHA.

Debt service. A review of the utility's debt obligations reveals a current annual debt service payment of $10,000. This annual obligation includes

Table B10

Funding Requirements for Capital Improvements Program

Item	Project						
	I	II	III	IV	V	VI	Total
Estimated total cost	358,500	154,500	485,000	523,500	232,000	69,300	1,822,800
Grant eligible amount*	333,000	146,000	450,000	489,000	217,000	16,000	1,651,000
Probable FmHA grant (65%)	216,450	94,900	292,500	317,850	141,050	10,400	1,073,150
Local funds Required	142,050	59,600	192,500	205,650	90,950	58,900	749,650
CDBG grant	39,400	17,000	53,200	56,000	25,400	9,000	200,000**
Bond requirement	102,650	42,600	139,300	149,650	65,550	49,900	549,650

* Not all items in project are grant-eligible.
** *Allocates prorata to total cost.*

payments on two previous bond issues and has an allowance for a reserve account.

The funding requirements for the proposed capital improvements program include a bond issue in the amount of $549,650. Assuming a 35-year bond issue at a 10-percent interest rate and a 10-percent collection as a reserve fund, the annual debt service for the new issue is approximately $62,693.

Annual payments schedule. Anticipated annual payments after implementation of the improvement program are summarized in Table B11.

Table B11

Summary of Annual Payments for Next Fiscal Year

Item	Annual Payment
Annual operation and maintenance	$ 89,355
Existing debt service	$ 10,000
New debt service	$ 62,693
Vehicle and equipment replacement fund	$ 10,000
Contingency operation and maintenance	$ 8,000
	$180,048

Additional revenue requirements

Based on the analysis presented in Table B9, projected annual revenues at current billing rates are approximately $157,392, which is $22,656 less than anticipated expenditures. It is suggested that the additional revenue requirement be shared equally between the consumers joined to the system and enjoying the benefits of a more dependable water supply.

The following increases in rates are suggested:

a. A $2/month increase in the minimum monthly charge.

b. A $2/month increase in the monthly billing for units located on the consumer side of a master meter.

c. A $0.05 per 1000-gal increase for water use in excess of 5000 gal used in any 1 month.

The estimated revenue created by these increases is shown in Table B12. The increases are projected to produce approximately $181,116 in new revenue. This rate structure is adequate to meet projected revenue requirements.

Table B12

Additional Revenue from Increased Service Charges

(Per Month)

Category of Consumer	Number of Consumers	Increased Billing Rate	Probable Revenue
0-3,000	245	$ 9.00	$ 2,205
Units on master meter	245	7.50	1,837
3,001-6,000	429	9.00	3,861
6,001-12,000	184	11.65	2,144
12,001-17,000	61	16.50	1,006
17,000-24,000	25	24.75	619
24,001-100,000	25	53.25	1,331
Over 100,000	13	160.75	2,090
Totals	1,225		$15,093

Note: $15,093 per month for 12 months is $181,116.

Financial feasibility

The monthly water bill for the average residential user is projected to range between $9.00 and $11.65 per month. The financial feasibility of the proposed improvement program is ultimately a political decision; however, the rates appear to be reasonable and in line with other rates throughout the area.

APPENDIX C: FINANCING CONSTRAINTS FOR WATER UTILITIES IN THE STATE OF ALABAMA

Extracted from a Memorandum Prepared by

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Background

Alabama has a variety of issuers that are empowered to finance water utility projects. Major issuers however are generally limited to municipalities, counties, and public corporations. Because of the multiplicity of legal constraints and statutory requirements, it is somewhat difficult to organize the analysis of the various financing techniques presented in the main body of this report. The organizational method selected for this presentation is to discuss each type of issue and under each to discuss the issuers authorized for that type of financing.

Securities Issued by Municipalities

General obligation bonds

Section 222 of the Alabama Constitution and Sections 11-81-51 et seq. of the Alabama Code Annotated (1975) authorize municipalities to issue general obligation bonds for water utility projects after an election held in the municipality respecting the issuance of such bonds. The maturity schedule for the bonds as well as the maximum rate of interest which the bonds are to bear must be set forth on the ballot. Maturity of the bonds is limited to 30 years. The bonds are chargeable against a 20-percent debt limit which is computed with respect to the assessed valuation of property in the municipality. In cities with a population greater than 6000, such debt limit is not applicable to bonds issued for water utility projects. Because a tender option could have the effect of shortening the maturities of the bonds in a manner not contemplated in the ballot, it is doubtful that the tender option would be available with respect to any such voted bonds. The problem could be eliminated by the adoption of legislation which would alter the required language on the ballot. There is no clear statutory authorization for the acquisition of bond insurance with respect to such bonds. The discount at which such bonds may be sold is limited to 5 percent in cities of more than 6000 population, but municipalities having a population of less than 6000 may sell such bonds at a discount of no more than 10 percent. Therefore, a deep discount bond issue would not be authorized. A statutory amendment would be required to eliminate this restriction. While there is no express statutory provision with respect to zero interest bonds, in those cases where the debt limitation is applicable,

it would provide a severe restraint on the technique which could only be eliminated by a constitutional amendment. Setting aside the policy considerations of the undesirability of having a floating interest rate on a general obligation security, the only legal restraint on a floating interest rate would be the statement of the maximum rate in the ballot on the bonds. A floating rate would be undesirable because the factors which would cause an interest rate to rise may not be the same factors which would increase the general revenues of the issuer to enable it to pay the higher debt service. There is no provision in law for the issuance of any type of interim financing in anticipation of the delivery of the long-term financing with respect to voted bonds by municipalities.

Revenue bonds

Sections 11-81-169 et seq. of the Alabama Code Annotated (1975) authorize municipalities to issue water revenue bonds. Such bonds may mature over a period of not more than 50 years and may be secured by pledges of revenues from another utility system owned by the issuer. For example, revenues from a sewer system could be used to repay water utility bonds. There is no express authorization for a tender option or for a variation in rate applicable to a bond after it is issued. Any such provisions would have to be validated by corrective legislation. The statutory authority for the payment of a premium on bond insurance is not clear, and additional legislation would be desirable. There is no express authorization for, but there is no prohibition on, sale of such bonds at a discount. There is no prohibition on zero coupons or on floating rates of interest. The direct relationship between the factors which would cause interest rates to rise and an increase in water revenues effectuated early enough to produce sufficient revenues to reflect such increased interest rate is not apparent. Section 11-81-165 (Alabama Code Annotated 1975) expressly authorizes the issuance of bond anticipation notes payable out of and secured by a pledge of the water revenues and payable from the proceeds of long-term bonds. The notes are limited to a 24-month initial term and may be renewed under such terms that the final date for payment is not more than 3 years from the date of the original borrowing. None of the other alternative interim financing techniques are expressly authorized by the statute.

Warrants

Section 11-81-4 (Alabama Code Annotated 1975) authorizes municipalities to issue water revenue warrants. Such warrants are limited to a 30-year term.

They would not be charged against the constitutional debt limit. The warrants must bear interest; therefore, zero coupons would not be permitted without an amendment of the statute. Except as just stated, the revenue warrants would be subject to the same comments made above with respect to revenue bonds. Not only is temporary financing permitted, the statutory pattern for the issuance of such warrants would require that a short-term general obligation security be issued which would then be refunded by the water revenue warrants.

Section 11-81-4 (Alabama Code Annotated 1975) authorizes municipalities to issue general obligation warrants for water utility purposes. These general obligation warrants may be additionally secured by a pledge of revenues from the water system.

Securities Issued by Counties

General obligation bonds

Counties in Alabama can issue general obligation bonds for water systems in the same manner and subject to the same restraints as applied to such bonds issued by municipalities. However, a county's constitutional debt limit is 7 percent of the assessed valuation of the property in the county and there is no population classification which would permit an elimination of the debt limitation.

Revenue bonds

Counties may issue water revenue bonds under the same statutory pattern and subject to the same provisions as similar securities issued by municipalities.

Warrants

Counties are authorized by Section 11-9-20 et seq. (Alabama Code Annotated 1975) to issue general obligation warrants for the purpose of financing water systems without the requirement for an election. These warrants are limited to a 30-year term, are chargeable against the county's constitutional debt limit, and may be additionally secured by pledges of a 5 mill ad valorem tax, any other tax that may lawfully be used by the county for such pledge, and the revenues of the water system. Comments made above with respect to the tender option on other general obligation securities would similarly be applicable to those described in this paragraph and the statute requires that the warrants bear interest and so a zero coupon could not be permitted without a

statutory amendment. Comments made above with respect to a floating rate of interest are also applicable to such warrants. There is no express statutory procedure for interim financing.

Securities Issued by Public Corporations

Water or utilities board

The most frequently used vehicle for financing water improvements in Alabama is a municipal water or utilities board organized under Section 11-50-310 et seq. (Alabama Code Annotated 1975). Such boards have broad power with respect to construction of one or more utility systems and with respect to cross-pledges of revenues from, for example, a sewer system, to the payment of debt service on bonds for water improvements, and vice versa. The bonds of such a board, which is a public corporation separate from the municipality which authorized its incorporation, are not subject to any constitutional debt limitations or sales price limitations, but there is no express authorization in the statute for bond insurance, a deep sales discount, floating interest rates, or the tender option. In addition, there is no express authority for the issuance of short-term financing instruments. This latter problem, however, is typically solved by the issuance of bonds under the statute which merely have a short term and the refunding of those short maturity bonds by the long-term bonds. The bonds must bear interest at a stated rate and hence zero interest bonds would not be permitted. Problems with respect to bond insurance, deep discount, zero coupons, or floating rates could be solved by legislation.

Board of water and sewer commissioners

Another type of public corporation available for use by municipalities in financing water improvements is a board of water and sewer commissioners organized in accordance with Section 11-50-340 et seq. (Alabama Code Annotated 1975). The board of water and sewer commissioners has powers equivalent to those of a municipal water or utilities board.

Water authority

In the same way that municipalities are permitted to avoid the restrictions of certain constitutional and statutory provisions by the creation of public corporations such as those described in the above paragraphs, counties are permitted to avoid similar restrictions by the creation of a public

corporation known as a water authority in accordance with Section 11-88-1 et seq. (Alabama Code Annotated 1975). These water authorities may operate in more than one county. The statutory provisions for such authorities have recently been amended to grant them extremely broad powers with respect to the purchase of bond insurance, issuance of discount securities, and use of zero coupons and floating interest rates. They also have the express statutory power to issue bond anticipation obligations as an interim construction financing technique and hence they are under present law most suited for the innovative techniques discussed in the request for information.

Water district

A flexible law permitting cooperation between municipalities and counties in the financing of water improvements is provided in Chapter 89 of Title 11 of the Alabama Code Annotated (1975) through the authorization of a water district as a separate public corporation. The water district law is similar to the water authority law discussed above, except that it permits the participation of municipalities in the incorporation of the water district. On the other hand, the water district law was not amended at the same time that the water authority law was amended and, therefore, statutory action would be required to implement the innovative financing techniques, except that a district has the power to use the proceeds of its bonds for the payment of a premium on bond insurance.

Summary

In many cases, there may be some question as to the ability of a particular issuer to use any or all of the innovative/creative financing techniques discussed above. These questions are generally caused by either the absence of case law interpreting the pertinent statutory provision; or use of language in a statute which, while perhaps not intending to restrict the operation of the statute, has that effect because of the exact terminology employed. Although in most cases it is unlikely that the language was intended as a prohibition against a technique, often the language of a statute has the effect of constituting a prohibition, or at least raising serious questions with respect to the appropriate interpretation as it relates to a specific financing technique. For these reasons, bond counsel is usually reluctant to give unqualified approval of the technique.

In general, Alabama has very broad provisions for financing of water utility projects. However, not all techniques are available. The availability of a specific technique can be classified as either: expressly authorized, expressly prohibited, and not expressly authorized. Tables C1 and C2 present a summary of the status of the various techniques in Alabama. It should again be pointed out that any specific proposal for water utility financing should be reviewed by competent counsel.

Table C1

Status of Interim Financing Techniques in Alabama*

Political Entity	Bond Anticipation Notes	Secured Bond Anticipation Notes	Direct Bank Loans	Commercial Paper	Demand Notes
Municipalities	A	A	NEA	NEA	NEA
Municipal utilities board	NEA	NEA	NEA	NEA	NEA
Municipal board of water commissioners	NEA	NEA	NEA	NEA	NEA
Counties	A	A	NEA	NEA	NEA
Water authority	A	NEA	NEA	NEA	NEA
Water district	NEA	NEA	NEA	NEA	NEA

* NEA = Not expressly authorized, statutory modifications recommended; A = authorized.

Table C2

Status of Long-Term Financing Techniques in Alabama*

Political Entity	Conventional General Obligation Bond	Conventional Revenue Bond	Tender Option Bond	Bond Insurance	Original Issue Discount Bond	Zero Interest Bond	Floating Rate Interest Bond
Municipalities	A	A	NEA	NEA	A	A	General obligation - P Revenue - NEA
Municipal utilities board	P	A	NEA	A	A	A	NEA
Municipal board of water commissioners	P	A	NEA	A	A	A	NEA
Counties	A	A	NEA	NEA	A	A	General obligation - P Revenue - NEA
Water authority	P	A	NEA	A	A	A	A
Water district	P	A	NEA	A	A	A	A

* NEA = Not expressly authorized, statutory modifications recommended; P = prohibited, statutory modifications required; A = authorized.

APPENDIX D: FINANCING CONSTRAINTS FOR WATER UTILITIES IN THE STATE OF KENTUCKY

Extracted from a Memorandum Prepared by

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Background

Municipal government and governmental services in Kentucky are provided by various political subdivisions created either by the Constitution of the Commonwealth or by the Kentucky Revised Statutes (KRS) enacted by the General Assembly of the Commonwealth. Some political subdivisions, such as counties and cities, have general governmental powers and have been delegated authority to act in most areas concerning the public welfare. Other subdivisions are special purpose creatures of the General Assembly, created for a limited function. In many areas the jurisdiction and authority of the "general" and "special" governmental units overlap.

Kentucky's present Constitution was adopted in 1891 and its framers' financial philosophy may be described in four words--"Pay as you go!" Regardless of the merit, or lack of it, expressed by that oversimplification, the present Constitution is a fact of political and legal life and prospects for change seem remote in light of past nonpartisan and well-organized campaigns for constitutional reform, all being so far rejected by the voters of the Commonwealth.

Section 158 of the Constitution *limits each* of the various classes of cities to a total indebtedness which cannot exceed a fixed percentage of the total assessed value of taxable property. The limitation varies from a 10-percent figure for cities of the first class to 3 percent for cities of the sixth class. All other political subdivisions, including counties, are limited to a total indebtedness not to exceed 2 percent of the total assessed value of property subject to taxation. An exception to the percentage limitation has been allowed by the courts "in case of emergency" where the "public health or safety should require."

Section 157 of the Constitution places an additional limit on all political subdivisions' indebtedness; no indebtedness may be incurred in a single year in an amount greater than the political subdivision's anticipated revenue for that year without the approval of a <u>two-thirds</u> (not a simple) majority of those voting on the question. The net effect of Section 157 is to prohibit the issuance of general obligation bonds unless the two-thirds majority can be obtained. As a practical matter, without some outside inducement (i.e., availability of "matching" Federal funds or dire emergency), Kentucky voters have

been markedly reluctant to approve general obligation indebtedness submitted to them.

The limitations imposed by Sections 157 and 158 are concurrent, but the scarcity of general obligation bonds of Kentucky municipalities can more probably be traced to the two-thirds majority restriction.

Kentucky's highest court, in numerous decisions over the years, has determined and repeatedly affirmed that revenue bonds are not to be considered an indebtedness of the issuing political subdivision within the meaning of either Section 157 or 158 of the Constitution and those limitations have been interpreted as applying only to general obligations backed by the full faith and credit of the issuer.

Traditional Financing

General obligation bonds

As noted in a previous section, a general obligation indebtedness of a Kentucky political subdivision requires a two-thirds majority of those voting on the question at a general election. If approved by the voters, all general obligation bonds must be validated in the local Circuit Court.

General obligation bonds are backed by the full faith and credit of the issuer and are payable from "unlimited taxes"; that is, the tax rate is not limited to a percentage or dollar figure and the measure of the tax is solely the amount necessary to produce annual sinking fund requirements for the principal and interest requirements on the bonds. The right is always reserved in the issuer to pay general obligation bonds from sources other than the ad valorem tax on real and personal property.

Because of the difficulty in obtaining the required two-thirds majority and because water utilities in most instances are "self sustaining," general obligation bonds have seldom, if ever, been utilized in Kentucky for financing water utilities.

General obligation bonds might be considered as a "backup" in certain rural areas where projected revenues for water utilities might be marginal in order to enhance the marketability of the community's financing. Although to this writer's knowledge this mechanism has never been utilized for rural water utilities, a similar plan has been employed on a number of occasions for buttressing industrial development bond financing.

In theory, general obligation bond financing is available to all Kentucky political subdivisions.

Assessment bonds

Various Kentucky Statutes authorize the utilization of assessment bonds for financing water utilities. Water Districts under KRS Chapter 74 are empowered to employ "pure" assessment bonds or a "revenue-assessment" bond hybrid.

Although the specific procedures for the authorization of assessments vary from Statute to Statute, certain common prerequisites prevail. Firstly, the scope of the proposed utility improvement must be clearly identified and those parties subject to the assessment given adequate notice.

Secondly, the exact method of the assessment (i.e., front foot basis, square foot basis, or benefits received basis) must be selected and the correlation between the cost of the project and the cost to each benefited property owner must be clarified.

Thirdly, public hearings on the proposed assessment must be conducted, with those proposed to be assessed given ample opportunity to appeal the issuer's decision to the local Circuit Court; however, once the appeal period has expired or favorable judicial determination has been made, the issuer may proceed with the improvement and the issuance of bonds payable from annual assessments against the benefited property.

In most instances, the Statutes grant the benefited property owner the right to elect to pay the assessment in full within a statutory period or elect to pay in annual installments to be applied to principal and interest requirements on the assessment bonds.

The benefited property is subjected to a lien in favor of the bondholders and the annual special assessment is collected on the same tax bill as the issuer's regular ad valorem property taxes.

Hybrid revenue-assessment bonds

The revenue-assessment bond hybrid is unique to water districts under KRS Chapter 74. KRS 74.370 allows the District's governing body to make a determination prior to the issuance of any obligations as to what financing route it desires. The District has the right to limit the security and source of payment of its bonds to the revenues of the water system financed therefrom. In the event the District so determines, no assessments may be made on benefited property even in the event revenues should prove insufficient for debt

service; provided, however, it is equally clear that by covenant in the bond authorizing documents, the District can reserve the right to levy full assessments or such assessments as it should determine necessary in order to supplement revenues of the system in the payment of bonds.

Pure revenue bonds

By far the most common form of debt obligations utilized by Kentucky political subdivisions in financing water utilities is the "pure" revenue bond obligation, the source of payment of which is limited to the income and revenues of the system which it finances.

As previously indicated, Kentucky's highest court has determined that bonds payable from the "revenues" of a particular public project are not to be considered an indebtedness within the meaning of the Constitutional debt limit restrictions, which has been interpreted as applying only to general obligation bonds.

Two basic Statutes are available to Kentucky political subdivisions for financing water utilities on a revenue bond structure: KRS Sections 58.010 through 58.140 and KRS Sections 96.350 through 96.510 (the latter Statutes being required to be utilized by water districts in revenue bond financing).

Other than certain slight technical variations, the chief distinction between the two Statutes is the security for the bonds. Under KRS Chapter 58, the bonds are secured by a lien on the gross income and revenues derived from the system with the right in the bondholders to have a receiver appointed to operate the system in the event of a default. Under KRS Chapter 96, in addition to a similar lien on the gross income and revenues of the system financed, bondholders are granted a statutory mortgage lien on the actual physical facilities of the system. As a practical matter this distinction is somewhat academic.

KRS Chapter 106 grants to both water districts and cities the power to acquire by purchase or condemnation existing water systems or to construct a system. This Statute in effect combines both features of KRS Chapter 58 and KRS Chapter 96.

Most revenue bond Statutes permit the capitalization of interest on the indebtedness for a period of up to 3 years and require the establishment of sinking funds for debt service, depreciation, and operation and maintenance funds.

It should be noted that Chapter 96 excludes utilization by cities of the

first class (Louisville) which, under special Statue, is limited to an entirely different method of financing with a separate corporation, the capital stock of which is owned by the City of Louisville.

Both KRS Chapters 58 and 96 are generally intended for long-term financing with bonds authorized for a maximum period of 40 years.

Bond anticipation notes

KRS 58.150 permits the issuance of bond anticipation notes pending the issuance of long-term financing for all types of obligations of Kentucky political subdivisions.

Bond anticipation notes are not required to be sold at public sale but may be sold on a negotiated basis after the issuer obtains three proposals from responsible lenders.

The term for bond anticipation notes may not exceed 5 years; however, the Statute does not contain any prohibition against renewals or rollovers.

All of the provisions which apply to the particular type of bond apply to the type of note issued in anticipation thereof except that the underlying security for the notes is the covenant by the issuer to ultimately issue the bonds or renewal notes to retire the initial note issue.

Conceivably, Kentucky political subdivisions could utilize bond anticipation notes within a comprehensive plan to avoid the higher interest rates on long-term maturities. In other words, 5-year notes could be issued payable partly from system revenues with a balloon maturity in the fifth year intended at the outset to be refinanced, thus gaining any advantage of the lower rates on the shorter term. However, because this method would involve recurring financing costs in the form of purchase discounts and financial and legal fees, it has been utilized only during periods of extremely high interest rates when issuers could not meet parity coverage under existing indentures.

Interlocal Cooperation Act

KRS 65.210 through 65.300 (known as the Interlocal Cooperation Act) permits any local governmental unit of the Commonwealth to enter into agreements with any one or more other local governmental units to finance necessary public improvements. The joint agency created is empowered to develop and finance any facilities which both have the power to embark upon independently.

KRS 151.330 authorizes the establishment of The Water Resources Authority of Kentucky with bonding capacity to assist local governments in financing

water resources. To the knowledge of the writer, this Authority has yet to be utilized for bonding purposes.

Innovative/Creative Long-Term Financing Techniques

Conventional

Conventional bond financing seems to be much preferred by the investment community in Kentucky except in times of extremely high interest rates when bond anticipation notes have been utilized. All of the Kentucky Statutes are designed with long-term bond financing in mind and amendments to provide specifically for bond anticipation notes have only been added in recent years as interest rates increased. Existing bond indentures contain covenants by the issuer which are likewise designed with long-term bond financing in mind. It should be emphasized that the covenants of the individual issuers in connection with their outstanding indebtedness are more restrictive than the general Statutes.

Tender options

Tender option bonds would immediately run afoul of existing bond indenture parity requirements and would necessarily have to be structured in bond anticipation note form. The "put" by the holder would precipitate the entire amount of the debt in the year of the put which would prohibit a tender option bond from in fact being a bond and require its consideration as a note. It appears that all of the drawbacks and none of the benefits of note financing would be available to the issuer.

Insured obligations

As noted above, the utilization of insurance is simply a determination based upon the expense of the insurance (which would necessarily have to be considered as a cost of issuance) as compared to the lower interest rate obtained.

Deep discount and zero interest obligations

Presuming that the Tax Equalization and Fiscal Responsibility Act amendments to the Internal Revenue Service Code have not detracted or prohibited this type of financing structure, conceivably these mechanisms could be tailored to fit existing bond indenture covenants. Mandatory sinking fund payments to retire bonds would necessarily be required to be within parity constraints; however, provisions for prior redemption vis-a-vis outstanding

parity obligations could create legal problems as original issue discount bonds would by necessity have preference in the eyes of the issuer for call as opposed to earlier outstanding obligations carrying lower rates.

Adjustable interest rates

Adjustable interest rates are prohibited for general obligation bonds under Kentucky law and in most instances forbidden by existing bond indentures due to parity requirements vis-a-vis undefined future debt service requirements.

Bond anticipation notes

This mechanism is clearly permitted for all types of bond financing in Kentucky under the provisions of KRS 58.150 and has been successfully utilized during periods of high interest rates.

Secured bond anticipation notes

Whatever security device was employed would necessarily have to be financed from the earnings of the system and, therefore, reduce annual revenues and accordingly the earnings/debt ratio required for parity coverage. The issuer, because of the Constitutional prohibition, could not go outside of the system in guaranteeing or providing for supporting credit from its general fund without the required two-thirds majority since the guarantee would constitute a commitment or potential liability tantamount to a debt.

Direct bank loans, commercial paper, and demand notes

Direct bank loans have and can be utilized by issuers under the negotiated sale provisions of the Statutes relating to note issuance. The "loans" would in fact be structured as bond anticipation notes. Use of the political entity's general credit as the security for the loans would be prohibited as being in effect a general obligation commitment. Conceptually, adjustable or floating rates could be utilized for this type of note since legally parity requirements would not have to be met. Practical problems would be encountered for larger issues as local banks would be limited in their portfolio for individual issuers. The expansion of the solicitation of the loan from other banks would amount to a full note offering. Another practical consideration could be the reluctance of banks to lend directly to municipalities without the intervening agency of a financial advisor (investment banker) to screen and review the debt structure for the bank.

Summary

The enabling Statutes regarding Kentucky municipal finance are fairly flexible. Tables D1 and D2 present a summary of the status of the various types of financing techniques.

As a practical matter, each individual issuer's contractual commitments on outstanding obligations must be considered in order to structure any financing mechanism for future debt. In essence, this requires a case-by-case study of each issuer. Bearing in mind that historically both the enabling legislation and the existing bond indentures were oriented toward long-term, level debt service financing, it is apparent that any deviation from the old pattern will encounter restraints.

Table D1

Status of Interim Financing Techniques in Kentucky

Political Entity	Bond Anticipation Notes	Secured Bond Anticipation Notes	Direct Bank Loans	Commercial Paper	Demand Notes
Municipality	A*	A (3)	A	NEA**	NEA
County	A	A (3)	A	NEA	NEA
Water district	A	A (3)	A	NEA	NEA

* A = Authorized; (3) = Subject to referendum if security is general credit of issuer beyond system financed.

** NEA = Not expressly authorized; statutory modification recommended.

Table D2

Status of Long-Term Financing Techniques in Kentucky

Political Entity	Conventional General Anticipation Bond	Conventional Revenue Bond	Tender Option Bond	Bond Insurance	Original Issue Discount Bond	Zero Interest Bond	Floating Rate Interest Bond
Municipality	A (1)*	A	A (2)*	A	A	A (2)	NEA** (2)
County	A (1)	A	A (2)	A	A	A (2)	NEA (2)
Water district	A (1)	A	A (2)	A	A	A (2)	NEA (2)

* A = Authorized; (1) = subject to referendum - two-thirds approval; (2) = subject to existing local convenants with regard to parity.

** NEA = Not expressly authorized, statutory modification recommended.

APPENDIX E: FINANCING CONSTRAINTS FOR WATER UTILITIES IN THE STATE OF MISSISSIPPI

Extracted from a Memorandum Prepared by

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Background

This appendix provides a review of existing statutory authority for the issuance of long-term debt and interim financing instruments in the State of Mississippi, with an emphasis on small communities and rural areas. Most of the financial requirements necessary to establish water systems in the state have traditionally been met through a combination of Federal and state grants and low- or no-interest loans. The Federal government, through the Department of Agriculture, Farmers Home Administration, has been a major source of grants and low-interest loans for such purposes to eligible communities, utility districts, and water associations.

Traditional Financing

Long-term revenue bond authority presently exists for municipalities, certain counties with military installations, unincorporated areas, and numerous entities existing under the authority of local and private laws.

Municipalities are also authorized to create fire districts within or adjoining their corporate area and to purchase or construct waterworks plants for the establishment or maintenance of fire service within such districts, with financing provided by the issuance of bonds secured by special assessments against the taxable property of such districts.

Additional long-term revenue bond issuance authority may be found in the various port commission statutes, as well as the numerous river basin development districts organized in the state.

Long-term general obligation bond issuing authority exists for municipalities and certain entities existing under the authority of local and private laws. In addition, municipalities may issue general obligation bonds for the construction of special improvements, including water mains and connections.

Interim financing authority exists for borrowing by municipalities, counties (limited to those with military installations), and utility districts organized in unincorporated areas in anticipation of the receipt of confirmed Federal or state grants or loans.

Counties with economic development districts organized on or before 25 April 1983 may establish industrial parks and make internal improvements

thereto, including the construction of water systems for industrial use. There also exists certain authority to finance water improvements in industrial parks under specified conditions in certain areas. The Industrial Park Law of 1960 also provides for the installation of water facilities on industrial park sites organized under its authority.

Although not a conventional source for financing water systems, authority exists for general obligation school bonds to be issued for this purpose. Other authority exists for the provision of water to vocational-agricultural high schools located in municipalities with a population of less than 700. State aid for the construction of school facilities, including the provision of water service, is also authorized.

Counties are authorized to bear up to one half of the expense of labor and material for laying water mains to extend municipal water systems for distances of up to 5 miles along roads on which one or more county schools are located.

Local governmental units, defined as any county, incorporated city, town or village, or school district in the State, are empowered by the Interlocal Cooperation Act of 1974 to enter into agreements with other such units for the joint exercise of authority, including the establishment of water systems. For example, if a city and a county authorized to operate water systems wished to jointly operate a water system, an agreement could be entered into under this act for the joint establishment and operation of such a system.

Under the "Housing Authorities Law," municipalities, counties, districts, and other public bodies of the state are authorized to establish housing authorities, which are empowered to issue bonds to provide, among other things, water facilities adjacent to or in connection with housing projects within the jurisdiction of the authority. In the case of municipalities, the area of operation includes the municipality and the area within 5 miles of its territorial boundaries.

The "Urban Renewal Law" provides that urban renewal agencies of municipalities, boards, commissions, authorities, districts, or other public bodies of the state can finance water service within their service areas by the issuance of bonds secured by the revenues of projects benefitted by the water system.

Innovative/Creative Financing Techniques

Tender option bonds

So-called "put" bonds, which grant the bondholder the option to tender long-term bonds to the issuer for redemption at par at specified short-term intervals, are not authorized under state law. All relevant statutory authority is limited to the issuance of long-term obligations which mature on a single stated date. Typical of such statutory language is that found in Section 21-33-315 (Mississippi Code Annotated 1972): "Each bond shall bear interest from its date to its stated maturity date at the interest rate specified in the bid." Identical language is found in Section 21-27-45, with similar language appearing in other relevant statutes.

Insured bonds

Express or implied authority of an issuer to pay the premium for municipal bond insurance must be found in the applicable enabling statute. Such authority does not appear to exist under most of the water system financing statutes discussed herein, although with sufficient advance planning, the authority could readily be obtained through local and private legislation.

Deep discount

Generally, bonds sold at significant discounts from par at the time of original issue are not permitted under applicable statutes. Several authorizing statutes, such as Section 21-33-315 (Mississippi Code Annotated 1972), specifically prohibit the sale of bonds for less than par and accrued interest. Other statutes are silent on the subject. Sections 21-33-326 and 19-5-28 (Mississippi Code Annotated 1975), which authorize interim financing in cases where there is a confirmed Federal or state grant or loan, provide for public or private sale for such price as may be determined by the issuer.

Zero interest bonds

The issuance of bonds paying no interest is generally not authorized under present State law. Such bonds would, of course, require a significant discount in order to be marketed. It should be noted that since 1 July 1983, effective date of the Tax Equilization and Financial Responsibility Act (TEFRA), the term "coupon bonds" is no longer appropriate since all municipal bonds issued with maturities of greater than 1 year must now be in registered form and therefore may not bear coupons. However, the significance of the term "zero coupon bonds" in the context of this discussion is that such bonds

bear no interest and, from the investor's standpoint, in effect substitute principal for interest.

Floater bonds

Bonds with no fixed interest rate are not authorized under the present state statutes authorizing water system financing, although such authority exists for other types of bonds, e.g., industrial development revenue bonds.

Other

There is currently no statutory authority for the issuance of "stepped coupon" bonds or bonds with warrants attached.

Alternative interim financing techniques

Except as discussed above, there is no authority for interim financing through "bond anticipation notes," as typically found in a number of other states. There is likewise no specific authority for the so-called secured bond anticipation notes, nor, in the context of water system financing, is there any provision for commercial paper or variable rate demand notes for the financing of water system construction and improvements.

Interim financing by means of direct loans from local financial institutions under the authority of Sections 21-33-326 or 19-5-28 (Mississippi Code Annotated 1972) is fairly common under conventional Farmers Home Administration financing.

Authorization of Innovative/Alternative Financing Techniques

Generally speaking, the only step required to effect the changes in present state statutes is simply for the Mississippi Legislature to amend the applicable statutes.

As noted throughout the preceding discussion, in some instances there is a total absence of statutory authority, while in others, there is language which implies either the existence, or the absence, of authority to engage in a certain practice. For example, in the case of put bonds, it would be necessary to repeal certain express statutory language and enact in its place express authority for the issuance of this form of bond.

Another approach, as was used in 1983 to provide general registration authority for all bonds issued in the state, thereby complying with the registration requirements of TEFRA discussed above, the Legislature enacted an omnibus statute, which, by its express terms, superseded all existing contrary

statutory language with regard to the issuance of bonds in registered form. The act further provided for the specific amendment of certain sections of the Code to remove express prohibitory language.

The net effect of such an approach is to enact a later superseding act which authorizes a certain form of bonds for all public debt issued in the state. As pointed out in the preceding discussion, such an approach would clearly provide the surest method of authorizing specific forms of innovative/ creative financing discussed herein.

Summary

Mississippi law currently authorizes bonded indebtedness for the financing of water utility improvements by virtually every form of political subdivision presently in existence. However, the existing authority is limited to the more conventional forms of public financing, and is something of a patchwork statutory scheme which has evolved over the years as a result of the ad hoc enactment of each of the various forms of public debt authority.

Tables E1 and E2 present the status of the various financing techniques in Mississippi.

Although not deemed to be within the scope of this study, it should be noted that there are numerous Federal and state tax considerations relating to the tax-exempt status of interest earned on municipal obligations. There are also numerous procedural requirements (e.g., protest procedures, publication requirements, and elections) which no attempt has been made to address in this report.

Table E1

Status of Interim Financing Techniques in Mississippi*

Political Entity	Bond Anticipation Notes	Secured Bond Anticipation Notes	Direct Bank Loans	Commercial Paper	Demand Notes
Municipalities	LA	NEA	LA	NEA	NEA
Counties	LA	NEA	LA	NEA	NEA
Utility districts	LA	NEA	A	NEA	NEA
Port commissions	NEA	NEA	NEA	NEA	NEA
River basin development districts	NEA	NEA	NEA	NEA	NEA
Economic development districts	NEA	NEA	NEA	NEA	NEA

* NEA = Not expressly authorized, statutory modifications recommended; A = authorized; LA = limited authority.

Table E2

Status of Long-Term Financing Techniques in Mississippi*

Political Entity	Conventional General Anticipation Bond	Conventional Revenue Bond	Tender Option Bond	Bond Insurance	Original Issue Discount Bond	Zero Interest Bond	Floating Rate Interest Bond
Municipalities	A	A	P	NEA	P	P	NEA
Counties	LA	LA	NEA	NEA	NEA	NEA	NEA
Utility districts**	A	A	P	NEA	NEA	P	NEA
Port commissions	A	A	NEA	NEA	NEA	NEA	NEA
River basin development districts	LA	LA	NEA	NEA	NEA	NEA	NEA
Economic development districts	LA	NEA	NEA	NEA	NEA	NEA	NEA

* NEA = Not expressly authorized, statutory modifications recommended; P = prohibited, statutory modifications required; A = authorized; LA = limited authority.

** Organized under general statute.

APPENDIX F: FINANCING CONSTRAINTS FOR WATER UTILITIES IN THE STATE OF TENNESSEE

Extracted From a Memorandum Prepared by

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Background

This appendix is limited to legal authority and constraints imposed by Tennessee law. Constraints imposed by Federal law or regulations or any rules imposed by any trade groups, market associations, or professional associations are not addressed.

Certain of the constraints imposed by Tennessee law are relaxed by statute in the case of bonds or notes sold to the Federal government or an agency thereof, most notably the Farmers Home Administration (FmHA). This appendix does not attempt to discuss these variations. The statutes are presently drafted in such a way to accommodate FmHA and other Federal agency lending policies.

Traditional Financing

The requirements, constraints, and enabling legislation will be discussed for each issuing agency. Public entities authorized to issue water utility bonds in Tennessee are counties, municipalities, utility districts, the State of Tennessee, and water and wastewater authorities.

Counties

Counties are authorized by Sections 5-11-101, et seq., Tennessee Code Annotated, to own, operate, and finance "waterworks, water distribution systems, and water storage and treatment facilities."

Long-term bonds. Section 5-11-103, Tennessee Code Annotated, authorizes counties to issue bonds to finance waterworks improvements. Section 5-11-102, Tennessee Code Annotated, requires that the bonds must mature serially not later than 40 years from date of the bonds, and interest must be payable semi-annually. Interest chargeable on the bonds is limited only by the state usury ceiling, which is five percentage points above the prime lending rate not to exceed 24 percent. Other bond terms are established by resolution of the Board of County Commissioners of the county, which is the elected legislative body of the county. The bonds may be (a) general obligations of the county, (b) secured solely by revenues of the waterworks system, or (c) secured primarily by and payable from such water system revenues but in the event of a deficiency in such revenues payable from taxes levied on all taxable property in the county. The county may either pledge gross revenues or net revenues of

the system. If the bonds are general obligation bonds or revenue and tax deficiency bonds, a resolution authorizing the bonds, the so-called "initial resolution," stating the amount, purpose, maximum interest rate, and source of payment of the bonds must be published in a local newspaper and the voters given an opportunity to protest the issuance of the bonds by petitioning for an election on the proposition whether to issue the bonds. A petition signed by 10 percent of the registered voters in the county is required to force an election. In addition, general obligation bonds and revenue and tax deficiency bonds must be sold at public sale at a price of not less than 98 percent of par and accrued interest. The bond proceeds may be used to pay the costs of construction and issuance expenses, to fund any reserve accounts, and to pay interest on the bonds during the period of construction and for 6 months thereafter.

Bond anticipation notes. Section 5-10-502, Tennessee Code Annotated, authorizes counties to issue notes in anticipation of bond proceeds for all purposes for which general obligation bonds can be issued. The notes must be authorized by the Board of County Commissioners for a term not to exceed 2 years. The notes may be issued only after the previously discussed initial resolution, authorizing the bonds in anticipation of which the notes are issued, is published and no protesting petition filed and after approval of the State Director of Local Finance, a division of the State Comptroller's Office. The notes may be extended for two consecutive 2-year periods upon approval of the State Director of Local Finance at the time of each extension. The notes may be sold at either public or private sale at a price of not less than 99 percent of par and accrued interest. The maximum rate of interest is the usury ceiling, and interest is normally payable semiannually, but not required by statute. The notes may be general obligations of the issuer, secured only by revenues of the water system, if issued in anticipation of revenue only bonds, or secured by revenues and taxes, if the bonds are so secured. The bond proceeds must be used to retire the notes when the bonds are issued.

Grant anticipation notes. Section 5-10-501(b), Tennessee Code Annotated, authorizes counties to issue notes in anticipation of grant funds for all purposes for which general obligation bonds may be issued. The notes must be approved prior to issuance by the State Director of Local Finance. The notes must be authorized by the Board of County Commissioners for a term not to

exceed 3 years. The notes may be extended for an additional 3 years upon approval of the State Director of Local Finance. The notes are secured only by the grant funds. The notes may be sold at either public or private sale at a price of not less than 99 percent of par and accrued interest. The maximum rate of interest is the usury ceiling.

Capital outlay notes. Section 5-10-501(a), Tennessee Code Annotated, authorizes counties to issue notes to make capital outlay expenditures for all purposes for which general obligation bonds can be issued. The notes must be authorized by the Board of County Commissioners and approved by the State Director of Local Finance prior to issuance. The maximum term is 3 years with two 3-year extensions allowed upon the approval of the State Director of Local Finance. The notes may be sold at either public or private sale at a price of not less than 99 percent of par and accrued interest. The notes are general obligations of the county.

Municipalities

Municipalities are authorized by Sections 7-36-101 et seq., Tennessee Code Annotated, to own, operate, and finance "waterworks and water distribution systems." The water system may be located within or outside the municipal boundaries, not to exceed a radius of 20 miles from the boundaries. The requirements and constraints for municipalities are almost identical to those of counties. Only the requirements peculiar to municipalities and different from counties will be pointed out.

Long-term bonds. Section 7-36-103, Tennessee Code Annotated, authorizes the issuance of bonds. All the requirements and constraints are the same as for counties, except that the municipality's elected legislative body authorizes the bonds rather than the Board of County Commissioners.

Section 7-34-101 et seq., Tennessee Code Annotated, provides an alternative means for municipalities to finance waterworks improvements. The bonds may be secured only by revenues, either net or gross, of the system. No initial resolution or opportunity for protest is required. The bonds may be sold at private sale with no limitation on bond discount. The maximum term is 40 years and interest must be paid semiannually. All other terms are established by the legislative body of the municipality.

Most municipal charters and certain other general bond laws also authorize the issue of bonds, but only after an election of the registered voters

of the municipality. Because of the election requirement, bonds are very seldom issued under these authorities.

Bond anticipation notes. Section 7-36-103(18), Tennessee Code Annotated, authorizes municipalities to issue notes in anticipation of bond proceeds for all purposes for which general obligation bonds can be issued. The notes are authorized by the elected legislative body of the municipality and are otherwise issued and sold as are county bond anticipation notes.

Revenue anticipation notes. Section 7-34-111, Tennessee Code Annotated, authorizes notes in anticipation of the collection of revenues from the water system. The notes shall have a term of not to exceed 5 years and shall be payable solely from system revenues. The notes can also be issued in anticipation of bond proceeds and funded by the bonds. The notes may be sold at public or private sale with no limit on the discount. Approval of the State Director of Local Finance is not required. The notes are the revenue statute functional equivalent of bond anticipation notes, and, as is the case with the bonds under that statute, are subject to fewer constraints.

Capital outlay notes and grant anticipation notes. Section 7-36-103(18), Tennessee Code Annotated, authorizes capital outlay notes and grant anticipation notes on the same basis as counties.

Utility districts

Utility districts are public corporations established by and under the jurisdiction of the County Executive of the county in which the district is located. The County Executive is the primary elected administrative official of the county. The district is governed by a Board of Commissioners appointed by the County Executive. Section 7-82-101 et seq., Tennessee Code Annotated, authorizes utility districts to conduct, operate, and maintain a system for the furnishing of water. A utility district has no taxing power so all its debt obligations are secured by water revenues only.

Long-term bonds. Section 7-82-501, Tennessee Code Annotated, authorizes utility districts to issue its bonds for water system improvements. The bonds must mature within 40 years from the date of the bonds and interest must be payable semiannually. Other terms are established by the Board of Commissioners. No initial resolution procedure is required and the bonds may be sold at public or private sale with no discount limitation. Prior to issuance of the bonds, the State Director of Local Finance must be given the opportunity to report on the bonds to the district. The report of the State Director of

Local Finance must be published in a local newspaper prior to issuance of the bonds, but a negative report will not prevent the issuance and sale of the bonds.

Bond anticipation notes. Section 7-82-304(10), Tennessee Code Annotated, authorizes utility districts to issue notes in anticipation of bond proceeds for all purposes for which bonds may be authorized and issued. The notes are secured by system revenues and bond proceeds and shall be limited to the amount of the proposed bond issue. The maximum maturity is 3 years with no opportunity for extension. The notes may be sold at public or private sale, but must be sold at a price of par and accrued interest.

Grant anticipation notes and capital outlay notes. The utility district statute does not contain authorization for capital outlay notes or grant anticipation notes.

State of Tennessee

Sections 53-2055 through 53-2072, Tennessee Code Annotated, authorize the State of Tennessee to make loans to counties and municipalities to make water system improvements. The state finances the loans by selling bonds secured solely by the agreements of the local government units to repay the state loan. The repayment agreement is embodied in a Loan Agreement between local government and state government, and the obligation of the local government is secured by system revenues, taxes on property within the local government unit, and state-shared tax revenues such as sales tax, liquor tax, and other such taxes collected by the state and remitted in part to the local government. The repayment schedule is structured to coincide with payments by the State of Tennessee on the bonds. The state can either issue notes or bonds. Any county or municipality not receiving state-shared taxes is not eligible for the loan program. The financing has the advantage of aggregating many small projects and marginal credits to produce one large issue with more desirable credit. It has the disadvantage of limiting local government flexibility and autonomy and subsidizing marginal credits with more desirable credits. The local government units with sufficient credit to go to the market on their own would probably not be helped materially by the program.

Water and wastewater treatment authorities

Section 68-13-601 et seq., Tennessee Code Annotated, authorizes municipalities and counties to establish water and wastewater treatment authorities with the power to construct and operate water and wastewater treatment

facilities and related facilities. The authority is governed by a five-member board appointed by the chief executive officer of the municipality or county and approved by the appropriate legislative body. The authority is empowered to issue bonds upon resolution of the governing board. The bonds may be payable from revenues only or from taxes of the creating municipality or county or from both. The bonds are subject to all the limitations and issued under the same procedure as bonds issued by cities and counties, except they can be sold at private sale without discount limitation and need not mature serially. The authority can also issue 1-year grant anticipation notes and 3-year bond anticipation notes. The statute has the advantage of removing the revenue bond-issuing process from the political arena and vesting it in the hands of the board. If taxes are to be pledged, the bonds must also be authorized by the parent governmental entity.

Innovative/Creative Financing Techniques

Long-term financing

Tender option or puts. The statutes for counties, municipalities, and utility districts are quite flexible as to terms of the bonds. The statutes do not specifically authorize "puts," but they do vest in the legislative body the power to fix maturity dates. Since put dates must be realistically viewed as a maturity date, it seems that the legislative body should have the power to fix such dates. The bonds would simply carry alternative maturity dates, the nominal maturity and the put maturity.

From a fiscal planning perspective, it is not believed that most issuers would be able to fund the put when made. Some additional security such as a letter of credit would seem necessary to provide assurance to the bondholder that his put would be honored and, alternatively, to ensure that the issuer not be required to drastically increase rates or taxes or both in order to avoid default. Although this appendix does not purport to address the impact of Federal tax law on the financing methods discussed, it should be pointed out that a reserve fund accumulated by the issuer in anticipation of the exercise of the put would probably be subject to invested sinking fund regulations of the Internal Revenue Code. The regulations require that, unless an exception can be found, yield on the investment of the reserve fund must be limited to a rate not materially higher than the yield on the bonds. The only

exception applicable would be the regulations which permit reserve funds of not to exceed 15 percent of the original proceeds of the bond issue. Therefore, if the put reserve together with all other reserves and sinking funds created from bond proceeds or to provide security for the bonds do not exceed 15 percent of the original bond proceeds, the issuer need not restrict yield. It seems extremely unlikely that a put reserve could be structured without imposing yield restrictions.

Insurance. Insurance is not specifically authorized by the statutes, but is not prohibited, and should be within the general powers of the respective issuers. It is permissible to pay the insurance premiums from bond proceeds as a cost of issuance expense.

Deep discount. As previously discussed, all bonds secured by general taxing power, whether conventional general obligation bonds or revenue and tax deficiency bonds, must be sold at public sale at a price of not less than 98 percent of par. In addition, bonds secured only by waterworks revenues and issued under authority of Section 7-36-101 et seq. and 5-11-101, et seq., Tennessee Code Annotated, must be sold at private sale, but at not less than 97-1/2 percent of par. Therefore, only utility district and authority bonds and municipal bonds secured solely by system revenues and issued under authority of Section 7-34-101, et seq., Tennessee Code Annotated, may be sold at a deep discount. Counties may not issue deep discount bonds.

Zero coupons. All the enabling statutes require that interest be paid semiannually. This requirement has been skirted in Tennessee by using "fractional coupons" or "01's" which provide for interest of one-hundredth of 1 percent (0.01 percent) per annual payable semiannually.

As an aside, financing arrangements employing deep discount bonds and fractional or zero coupons often also employ term bonds or term bonds with annual or semiannual mandatory redemption. Only Sections 7-34-101 et seq. (municipal revenue), 7-82-101, et seq. (utility district), and 68-13-601, et seq. (authority), permit term bonds. All other statutes require serial maturities.

Floater. All the enabling statutes confer upon the legislative body power to set such "rate or rates" as they deem proper. The intent at the time the statute was adopted 40 years ago was certainly that the "rates" established would be a fixed rate for each maturity. A reading of the statute to permit continuously adjusting rates probably goes beyond original legislative

intent. However, it can also be argued that the legislature intended to vest in the local government legislative body the power to establish the rate structure dictated by changing market conditions. The latter argument is probably more persuasive and would permit floating rate bonds. However, the permissibility of floaters in Tennessee is not as susceptible to a clear answer as are some of the other techniques.

It should be noted that floaters present more difficult problems to public issuers than to private sector issuers where such arrangements are more commonly used because the public sector issuer has less flexibility in reacting to fluctuations in interest rates. Most private sector issuers can pass a portion of increased interest cost along to consumers, but a private sector borrower can only increase rates and/or taxes which may be politically difficult and/or time-consuming. The public issuer likely could not react to interest rate fluctuations until a succeeding fiscal year.

Short-term financing

Bond anticipation notes. The above discussion (page F6) fully addresses the authority and constraints attendant to issuing bond anticipation notes.

Secured bond anticipation notes (BANS). The issue relative to secured BANS is not the power to secure BANS, which probably is implied in the statutes, but the power of the issuer to enter into a reimbursement agreement with a bank satisfactory for the bank to issue its letter of credit. The general language cited above granting power to contract debts for construction of public works projects is probably sufficient authority. Moreover, the reimbursement agreement probably would impose no greater liability on the issuer than the agreements required and rights obtained by a bond insurer who must pay on a bond insurance policy.

From the market perspective, however, adding the letter of credit as additional security for the BANS might not materially enhance their credit worthiness. Under the present scheme, all legal barriers to the issuance of bonds have been disposed of before the notes are issued. The only impediment would be a refusal of the issuer to issue the bonds or changes in market conditions. If market conditions change, the notes can be refinanced up to a total term of 6 years. If the notes cannot be further refinanced, the issuer could issue funding bonds pursuant to Sections 9-11-101, et seq., Tennessee Code Annotated. Funding bonds are issued when a municipality or county is unable to meet cash needs, whether budgetary or otherwise. It is our

experience that note purchasers view their only true risk as the risk that the issuer will simply refuse to issue the bonds, not that the issuer cannot issue the bonds. Stated another way, this is simply the risk of nonpayment which is always present. A letter of credit would certainly remove that risk, but past experience is that the letter of credit would not materially enhance note credit.

Direct bank loans. The general borrowing powers of the various issuers are sufficient to authorize bank borrowing. This method is utilized extensively in Tennessee, especially with small issues. Usually the loan is at a fixed rate but a variable rate is permissible. (See "Floater" discussion.)

Commercial papers. The statutes do not authorize commercial paper, but it could probably be structured as either bond anticipation notes or capital outlay notes. Commercial paper has not been used significantly by Tennessee issuers probably because the issues are so small that its use would not be cost-effective. Some problems would be whether the governing body must authorize paper at each rollover and whether the State Director of Local Finance must authorize each rollover. In view of the uncertainty in application of current statutes to commercial paper, it would seem that additional legislation will be needed before commercial paper can be used.

Demand notes. The variable rate and tender option features of demand notes would be subject to the same discussion contained under the discussions of tender options and floaters. The latitude given a governing body in structuring a note issue is probably broad enough to permit demand notes. In addition, the issuers probably also have the power to obtain a letter of credit and execute a reimbursement agreement.

Necessary Changes

Long-term financing

Conventional long-term. None.

Tender option or puts. None.

Insurance. None.

Deep discount. Additional legislation would be mandatory to allow counties to issue deep discount bonds or to allow general obligation or revenue and tax deficiency deep discounts.

Zero coupons. Additional legislation would be needed for zero coupons.

However, the functional equivalent, fractional coupons, can be used under current law. Additional legislation would be needed to allow general obligation or revenue and tax deficiency term bonds.

Floaters. Additional legislation would be desirable, but existing law is probably sufficient.

Short-term financing

Bond anticipation notes. None.

Secured bond anticipation notes. Additional legislation would be desirable to supplement existing broad power statement.

Direct bank loans. None.

Commercial papers. Legislation needed.

Demand notes. Additional legislation would be desirable to supplement existing broad power statement.

Summary

Tennessee statutes authorizing waterworks financing are generally quite broad and flexible. The statutes skirt more cumbersome procedures, such as elections and validation, required in other states. Nevertheless, not all the creative financing techniques can be employed in Tennessee. The status of the specific financing techniques is presented in Tables F1 and F2. The most significant restriction is the restriction on deep discount general obligation bonds. Only legislation can change the current situation. In the areas in which legislation is desirable, competent, conservative bond counsel might insist upon such legislation. As a result, before attempting to implement any questionable techniques, Tennessee bond counsel should be consulted.

Table F1

Status of Interim Financing Techniques in Tennessee*

Political Entity	Bond Anticipation Notes	Secured Bond Anticipation Notes	Direct Bank Loans	Commercial Paper	Demand Notes
Municipality	A	NEA	A	NEA	NEA
County	A	NEA	A	NEA	NEA
Utility district	A	NEA	A	NEA	NEA
Water authority	A	NEA	A	NEA	NEA
State of Tennessee	A	NEA	A	NEA	NEA

* NEA = Not expressly authorized, statutory modifications recommended; A = authorized.

Table F2

Status of Long-Term Financing Techniques in Tennessee*

Political Entity	Conventional General Anticipation Bond	Conventional Revenue Bond	Tender Option Bond	Bond Insurance	Original Issue Discount Bond	Zero** Interest Bond	Floating Rate Interest Bond
Municipality	A	A	A	A	A†	P	NEA
County	A	A	A	A	P	P	NEA
Utility district	P	A	A	A	A	P	NEA
Water authorities	P	A	A	A	A	P	NEA
State of Tennessee	A	P	A	A	?	?	?

* NEA = Not expressly authorized, statutory modifications recommended; P = prohibited, statutory modifications required; A = authorized.

** Fractional interest, 0.01%, permitted.

† Revenue bond only.

APPENDIX G: GLOSSARY OF FREQUENTLY USED WATER SUPPLY TERMS

Abandonment - A legal term used to designate the giving up, with the definite intent to do so, of the right to use water for any purpose, or of the method of using water.

Accrued depreciation - The estimated loss in service value of the utility plant accrued before the date of the balance sheet.

Active water - Water having corrosive qualities.

Advances for construction - A liability for money received to finance construction.

Alkaline water - Water having a pH greater than 7.0 or high in percent sodium (approaching or exceeding 60), but relatively low in total dissolved solids.

Appraisal - The act of estimating the value of property or the value of property as estimated by a property valuation expert.

Aquifer - A porous, water-bearing geologic formation.

Assessment district - The land or area created by statutory enactment within the boundaries of which the cost of an improvement is assessed for the benefits derived.

Assets - Any property of value owned by an enterprise.

Audit - An examination of the subject matter of the accounting in all its financial aspects, including, so far as the several classifications of accounts may be involved, the verification of assets, liabilities, receipts, disbursements, revenues, expenditures, reserves, and surplus in the detail necessary to permit certification of the statements rendered and the accountability of the fiduciary parties.

Battery of wells - A group of wells from which water is drawn by a single pump or lifting device. Also called gang of wells.

Benefits - The advantages, tangible or intangible, gained by the installation or construction of a system or works for one or more given purposes.

Bond - A written promise to pay a specified sum of money (called the face value) at a fixed time in the future (called the date of maturity).

Bond discount - The excess of the face value of a bond over the price for which it is acquired or sold.

Bonded debt - The portion of the indebtedness of an enterprise represented by outstanding bonds.

Bond premium - The excess of the price at which a bond is acquired or sold over its face value.

Book value - Value as shown on the books, regardless of whether such value is understated or overstated.

Bored well - A well that is excavated by means of an auger (hand or power) as distinguished from one that is dug, drilled, or driven.

Bubbling spring - A spring originating in a pool where ascending water currents or escaping gases cause the water to bubble on the surface of the pool.

Callable bond - a type of bond which permits the payment of the obligation before the stated maturity date by giving notice of redemption in a manner specified in the bond contract.

Capital assets - Assets of a relatively permanent nature such as buildings and equipment (fixed assets).

Capital expenditures - Expenditures which result in the acquisition of, or the addition to, capital assets.

Carrying capacity - The maximum rate of flow that a conduit, channel, or other hydraulic structure is capable of passing.

Cast iron pipe - A pipe made from pig iron cast in a revolving, water-cooled mold, or in a stationary, cylindrical sand mold with a round, central core.

Charge for conditional water service - The amount that a consumer who has one source of water supply, but who, for dependability, contracts for a second source of supply is charged for readiness to supply up to a stated quantity of water from a second source.

Chemical analysis - Analysis by chemical methods to show the composition and concentration of substances.

Chemical coagulation - The destabilization and initial aggregation of colloidal and finely divided suspended matter by the addition of a floc-forming chemical.

Chemical precipitation - Precipitation induced by the addition of chemicals or the process of softening water by the addition of lime or lime and soda ash as precipitants.

Chlorination - The application of chlorine to water for the purpose of disinfection or other biological or chemical result.

Cistern - A small covered tank for storing water for home or farm, usually placed underground.

Clarification - Any process or combination of processes the primary purpose of which is to reduce the concentration of suspended matter in a liquid.

Clarifier - A device of which the primary purpose is to secure clarification.

Clear well - A reservoir for the storage of filtered water of sufficient capacity to prevent the necessity of frequent variations in the rate of filtration with variations in demand.

Coagulation - The destabilization and initial aggregation of colloidal and finely divided suspended matter by the addition of floc-forming chemicals.

Combination well - A well system consisting of an open well and one or more wells or infiltration galleries which are connected with it.

Commitments - Agreements to purchase and/or sell specified materials or services from particular parties or their agents.

Common law - The body of law developed in England prior to the establishment of the United States. It refers principally to rights and privileges and, while generally followed in the United States, has in some of its applications been abrogated or modified, as in the case of riparian rights to water in some jurisdictions in the United States.

Complete diversion - Taking or removing of water from one location in a natural drainage area and the discharge of it into another drainage area.

Composite rate of depreciation - A single depreciation rate to be applied against the total depreciable assets to determine the depreciation for an accounting period.

Constant spring - A spring in which variation in discharge from maximum to minimum does not exceed one third of the average discharge.

Consumer - A household, building, institution, merchantile establishment, industrial plant, or other user receiving water through a service pipe.

Consumptive use of water - Any use of water that depletes the available supply.

Contact spring - A spring where water flows to the surface from permeable material over an outcrop of less permeable or impermeable material which retards or prevents the downward percolation of the groundwater and thus deflects it to the surface.

Cost accounting - The method of accounting that provides for assembling and recording of all the elements of cost incurred to accomplish a purpose, to carry on an activity or operation, or to complete a unit of work or a specific job.

Customer - The most generally accepted term for the party receiving service of water.

Dam - A barrier constructed across a watercourse for the purpose of 1) creating a reservoir, 2) diverting water therefrom into a conduit or channel, 3) creating a head which can be used to generate power, and/or 4) improving river navigability.

Debt service - The amount of money necessary annually: 1) to pay the interest on outstanding debt; 2) to pay the principal of maturing bonded debt not payable from a sinking fund; or 3) to provide a fund for the redemption of bonds payable from a sinking fund.

Deferred charges - Expenditures not chargeable to the period in which made, but carried on the asset side of the balance sheet, pending amortization or other disposition.

Deferred credits - Credit balances or items spread over subsequent accounting periods either as an addition to income or as a reduction of certain expenses.

Deferred liabilities - Liabilities not elsewhere current in nature and on which payment or other disposition is deferred to a future accounting period.

Dependable capacity - The capacity which can be relied on for service during all but exceptional circumstances.

Depletion - The continued withdrawal of water from a stream or from a surface or groundwater reservoir or basin at a rate greater than the rate of replenishment.

Depreciation - The loss in service value of depreciable utility plant not restored by current maintenance due to all the factors causing the ultimate retirement of the property.

Depreciation rate - The rate or percentage at which value or usefulness of a property is being exhausted, usually expressed as an annual rate.

Design analysis - The tabulation and consideration of the physical data, present requirements, and probable future requirements pertaining to an engineering project, including the main features and principles of the design.

Developed water - Groundwater artificially brought to the surface or to the land which, without such diversion, would have run to waste or not have appeared in any known source. Flow of water in a stream that has been induced therein by artificial means.

Direct labor - Labor directly expended or applied in productive operations, as distinguished from that not directly connected with a productive process.

Direct materials - Materials which can be identified with a particular product or service and the cost of which can be charged directly to it.

Disinfection - The art of killing the larger portion of microorganisms in or on a substance with the probability that all pathogenic bacteria are killed by the agent used.

Diversion - The taking of water from a stream or other body of surface water into a canal, pipeline, or other conduit.

Domestic consumption - The quantity, or quantity per capita, of water supplied in a municipality or district for domestic uses or purposes during a given period, usually 1 day.

Drilled wells - A well excavated wholly or in part by means of a drill which operates by cutting or by abrasion.

Drill log - A chronological record of the soil and rock formations which were encountered in the operation of sinking a well, with either the thickness or the elevation of the top and bottom of each formation given.

Driven well - A well constructed by driving a casing, at the end of which there is a drive point, without the use of any drilling, boring, or jetting device.

Dug well - A well excavated by means of picks, shovels, or other hand tools, or by means of a power shovel or other dredging or trenching machinery, as distinguished from one put down by a drill or auger.

Easement - An acquired legal right to the use of land owned by others.

Economic depreciation - The loss in value resulting from external economic conditions affecting the character or degree of utilization.

Electric well log - A record obtained in a well investigation in rock from a traveling electrode; it is in the form of curves that represent the apparent values of the electric potential and electric resistivity or impedance of the rocks and their contained fluids throughout the uncased portions of a well.

Elevated storage - Storage of water in a tank supported on a tower.

Elevated tank - A tank, used for storage in a water distribution system, which is raised above the surface of the ground and is supported by posts or columns.

Encumbrances - Obligations in the form of purchase orders or contracts which reduce the balance of the particular budget account to which they are chargeable.

Examination of water - An examination to determine the physical, chemical, and biological characteristics of water.

Filter plant - The process, devices, and structures used for the filtration of water.

Filter rate - The rate of application of water to a sand filter.

Filtration - The process of passing a liquid through a filtering medium for the removal of suspended or colloidal matter.

Fire demand - The required fire flow and the duration for which it is needed, usually expressed in gallons per minute for a certain number of hours.

Fire demand rate - The rate of flow, usually expressed in gallons per minute, that is needed at a specified residual pressure for fire fighting at a particular location or in a certain area.

Fire supply - The quantity of water required for extinguishing fires, in addition to that required for domestic, industrial, and public use.

Fiscal period - Any period at the end of which an enterprise closes its books to determine its financial condition and the results of its operations; commonly 1 year, though not necessarily a calendar year.

Fixed assets - Permanent property, such as land, buildings, machinery, equipment, rights, and benefits (tangible and intangible), permanently used in the rendering of a service or in the production of a product.

Fixed capital - The investment represented by fixed assets.

Fixed charge - The carrying and operating cost of any business or project which continues to occur whether or not the business operates or produces anything. A charge that cannot be escaped, shifted, or altered such as interest, rent, taxes, and amortization.

Fixed liabilities - Liabilities which are to be paid 1 year or more after the date of a balance sheet.

Flat rate - A charge for water service that is not based on metered quantity.

Flow demand - The flow required to satisfy demands on a system, such as fire demand or industrial process water demand.

Flowing well - A well that discharges water at the surface without the aid or application of a pump or other lifting device.

Foreign water - Water occurring in a stream or other body of water which originated in another drainage basin.

Gallery - An underground structure designed to collect subsurface water.

Gang of wells - A group of wells from which water is drawn by a single pump or other lifting device.

Gravity filter - A rapid sand filter of the open type, the operating level of which is placed near the hydraulic grade line of the influent and through which the water flows by gravity.

Groundwater - Subsurface water occupying the saturation zone, from which wells and springs are fed.

Hardness - A characteristic of water, imparted by salts of calcium, magnesium, and iron such as bicarbonates, carbonates, sulfates, chlorides, and nitrates, that causes curdling of soap and increased consumption of soap, deposition of scale in boilers, drainage in some industrial processes, and sometimes objectionable taste.

Headwater - The upper reaches of a stream near its source or the region where groundwaters emerge to form a surface stream.

House cistern - A cistern in which rainwater is stored for household purposes.

Hydropneumatic system - A water system, usually small, wherein a water pump is automatically controlled by air pressure in a compressed air tank.

Induced recharge - The discharge of water from a stream or other body of water into an aquifer.

Industrial consumption - The quantity, or quantity per capita, of water supplied in a municipality or district for mechanical, trade, and manufacturing purposes during a given period, generally 1 day.

Industrial water - Water that is withdrawn from a source for sole use in an industrial water system.

Industry water requirement - The quantity of water required to produce a unit of product.

Infiltration gallery - A sizable gallery with openings in its sides and bottom, extending generally horizontally into a water-bearing formation, for the purpose of collecting the water contained therein.

Inventory - A detailed list showing quantities, descriptions, and values of property.

Job account - An account pertaining either to an operation which occurs regularly or to a specific piece of work, showing all charges for material and labor used and expenses incurred, together with any allowances or other amounts which may be credited.

Leakage - The uncontrolled loss of water from artificial structures as a result of hydrostatic pressure.

Leaseholds - Rights to the use of land for which a consideration has been paid, as distinguished from the ownership in the land.

Maintenance - The upkeep necessary for efficient operation of physical properties. It involves labor and materials, but is not to be confused with replacement or retirement.

Maximum sustained yield - The maximum rate at which groundwater can be withdrawn perennially from a particular source.

Meter - An instrument for measuring the quantity of water used.

Metered system - A water distribution system in which meters are used at all strategic points on main supply lines, pumping stations, reservoir outlets, connections to other political subdivisions, and at each consumer's service.

Meter rate - The charge for water based on the quantity used as measured by water meters.

Multipurpose reservoir - A reservoir constructed and equipped to provide storage and release of water for two or more purposes such as flood control, power development, navigation, irrigation, pollution abatement, or domestic water supply.

Mutual water company - A cooperative association that is organized to develop and distribute water that is owned and operated by those receiving water from it.

Natural flow - The flow of a stream as it occurs under natural, as opposed to regulated, conditions.

Natural water course - A surface or underground water source created by natural agencies and conditions.

New water - Groundwater artificially brought to the surface or to the land that, without such diversion, would have run to waste or not have appeared in any known source. Flow of water in a stream that has been induced therein by artificial means.

Nonartesian well - A nonflowing well in which the water does not rise above the zone of saturation.

Nonflowing well - A well that does not discharge water at the surface except through the operation of a pump or other lifting device.

Operating expenses - Expenses necessary for the maintenance of the enterprise and to the rendering of service for such operation and to the collection of revenue.

Original cost - The actual cost of a property to the person first devoting it to utility service.

Overdevelopment - The exceeding of the economic yield of groundwater from an aquifer.

Overpumping - The extraction by pumping of a quantity of water from a groundwater basin or aquifer in excess of the supply to the basin resulting in a depletion of the basin.

Perched groundwater - Groundwater that is separated from the main body of groundwater by an aquiclude.

Perched spring - A spring that has a perched zone of saturation as its source of water supply.

Percolating water - Subsurface water that passes through the soil or rocks along the line of least resistance and under the force of gravity, the limits of which are not particularly defined by less permeable formations, and which does not of itself form a part of any definite body of subsurface water or flow in any subterranean channel.

Physical assets - Permanent property of a physical nature, such as lands, buildings, mineral deposits, wells, reservoirs, plant equipment of all kinds, utensils, furnishings, rolling stock, and merchandise, intended for immediate use and permanent improvements (tangible assets).

Piping system - A system of pipes, fittings, and appurtenances within which a fluid flows.

Potable water - Water that does not contain objectional pollution, contamination, minerals, or infective agents and is considered satisfactory for domestic consumption.

Prechlorination - The application of chlorine to water prior to any treatment.

Pressure - The pressure per unit area above local atmospheric pressure.

Private use of water - The use of water by any agency engaged in the development and distribution of water when such use is limited to those connected with the agency so engaged.

Private utility - An enterprise owned by private individuals or by a corporation and operated for the purpose of rendering utility service.

Private water - Streams or other bodies of surface water that are not navigable or that are not publicly owned.

Private water supply - A water supply not available to the general public because it is located on or has outlets on private property to which the public does not have access or legal right of entry.

Public use water - The use of water by any agency engaged in the development and distribution of water when such water is offered to all consumers who can be served under the water system and who may apply for this service, up to the full capacity of such system.

Public water - Water that is open to public use.

Public water supply - A water supply from which water is available to the people at large or to any considerable number of members of the public.

Radial well - A strainer well system in which many strainers are driven horizontally into a water-bearing stratum, radiating from a central sump or tube well.

Rate base - The investment or established valuation on which a public utility is entitled to a fair return and on which rates may be based.

Rate making - The process of determining what the charges for water or other services furnished by a public utility should be to yield an adequate revenue.

Repairs - An element of maintenance, as distinguished from replacement or retirement.

Replacement - Installation of new or alternate equipment in place of existing equipment for a variety of reasons such as obsolescence, total disrepair, improvement, or modification.

Replacement cost - The cost of replacing property or the actual or estimated cost of duplication with a property of equal utility and desirability.

Right of access - A well-founded legal claim to approach, enter on, or be on the bank of a stream or other body of water.

Right-of-way - A right of passage over another person's land.

Riparian - Of, pertaining to, or situated on, the bank of a river or other body of water. One who owns land on the bank of a natural water course or body of water.

Riparian land - Land that abuts on the banks of a stream or other natural body of water.

Riparian water right - The legal right that assures to the owner of land abutting on a stream or other natural body of water the use of such water.

Safe yield - The maximum dependable draft that can be made continuously on a source of water supply (surface water or groundwater) during a period of years during which the probable driest period or period of greatest deficiency in water supply is likely to occur.

Salvage water rights - Legal rights to appropriate and use waters that would otherwise go to waste.

Seasonal depletion - Withdrawal of groundwater or surface water from a source at a rate in excess of the rate of supply during a given season, but not in excess of the average supply over a secular cycle. Withdrawal at a rate in excess of the average rate of supply over a secular cycle is termed cyclic withdrawal.

Seasonal storage - Storage of water in a reservoir during that portion of the year when an excess or surplus occurs in the source of supply.

Secular cycle - A period of time that includes a group of years during which the precipitation is, in general, considerably above the usual or average, plus a group of years during which it is, in general, considerably below the average.

Serial bonds - Bonds with established date of maturity, usually year by year.

Service - Any individual person, group of persons, thing, or group of things served with water through a single pipe, valve, or similar means of transfer from a main distribution system.

Service age - The period of time between the date when a physical unit of property was put into service new as a part of the property and the date of making the mortality study.

Service charge - A rate charged by the utility for rendering service, usually used as a ready-to-service charge.

Service connection - A pipeline, with its appurtenances, that branches from or connects a water main with the premises of a consumer.

Service life - The period of time between the date when a physical unit of property was first put into service new as a part of the property and the date when it was retired, or is anticipated to be retired, from service.

Service meter - A water meter installed on a consumer's service line.

Service pipe - The pipeline extending from the water main to the building served.

Sinking fund - A fund established by periodic installments to provide for the retirement of the principal of term bonds and of other bonds specified to be retired from sinking funds.

Soft water - Water having low hardness usually less than 60 mg/ℓ.

Specifications - Precise standards of performance or construction appropriate for construction work, materials, and manufactured goods, which make possible the expression and expected value when they are purchased or contracted for and which provide a means of determining their conformance with expectation after they are purchased or constructed.

Storage - The impounding of water for future use, either in surface or in underground reservoirs.

Subterranean stream (water) - A stream flowing through large interstices or openings in rock, such as caves or caverns. A well-defined body of groundwater having a measurable, even though small, velocity flowing in a definite direction.

Supplemental water supply - Sources furnishing the additional supplies when water is obtained from more than a primary source.

Supply lines - Conduits between a source of water supply and a distribution system.

Tangible assets - See physical assets.

Unbilled sales - The estimated amount due a utility for services rendered but not yet billed.

Underground utilities - Systems of pipes and conduits beneath the surface of city streets or developments for conveying water, wastewater, gas, etc.

Underground watercourse - A known and defined subterranean channel, created by natural conditions, that contains flowing water.

Unit cost - The cost of a unit of product or service; for example, the cost of pumping a million gallons of water.

Unit water use - The quantity of water used at an industrial plant per unit of production.

User - The party who is billed for water service from a single connection (see customer).

Utility - An enterprise engaged in the performance of some public service such as furnishing water, gas, or communications.

Water demand - A schedule of the water requirements for a particular purpose, as for power generation, municipal and industrial supply, irrigation, etc.

Water district - An organization, created and operating under statutory authority enactment, for the purpose of financing, constructing, and operating a water supply system. The land or area within the boundaries of a water district, as delineated in the organizing statute.

Water main - The water pipe from which water supply is delivered to the service pipe leading to specific premises.

Water meter - A device installed in a pipe under pressure for measuring and registering the quantity of water passing through it.

Water metering - The measurement of water supplied to consumers by the installation of a meter at each consumer's service.

Water mining - The extraction of water from a groundwater basin at an annual rate greater than the average annual recharge to the basin, leading to eventual depletion of the stored water.

Water rate - The charge for water consumed by consumers per unit of measurement, whether measured by metering or by a flat rate.

Water rights - The legal powers or privileges recognized as validly existing under the applicable system of law, in, upon, or concerning waters, as such powers or privileges held by nations, states, corporations, or individuals exist in the light of the powers and privileges of others in the same waters.

Water rights acquired by prescription - Water rights acquired by the open, actual, notorious, exclusive, long-continued performance of certain acts or operations, which in themselves are detrimental or injurious to the rights of another party, performed under claim of right to do them, and with the knowledge of their performance on the part of the other party.

Water right value - The value, expressed in dollars, of the right to use water occurring in a given source.

Water service pipe - The pipe from the water main or other source of water supply to the building served.

Water service schedule - A statement required from water supply utilities by state regulatory commissions, setting forth the rates to be charged consumers.

Water softening - The process of removing from water, in whole or in part, those cations which produce hardness.

Water supply - The furnishing of a good potable water under satisfactory pressure for domestic, commercial, industrial, and public service; an adequate quantity of water under reasonable pressure for fire fighting.

Water supply facilities - The works, structures, equipment, and processes required to supply and treat water for domestic, industrial, and fire use.

Water supply source - A stream, lake, spring, or aquifer from which a supply of water is or can be obtained.

Water supply system - Collectively, all property involved in a water utility including land, water source, collection systems, dams and hydraulic structure, water lines and appurtenances, pumping system, treatment works, and general properties.

Water tower - A tower containing a tank in which water is stored, normally for providing local storage in a distribution system where ground-level storage would provide inadequate pressure.

Water treatment - The filtration or conditioning of water to render it acceptable for a specific use.

Water treatment plant - The portion of water treatment works intended specifically for water treatment and may include, among other operations, sedimentation, chemical coagulation, filtration, and chlorination.

Water treatment works - A group or assemblage of processes, devices, and structures used for the treatment or conditioning of water.

Water waste survey - A survey undertaken to locate, measure, and control locations where water leaks away or is in any way wasted.

Water well - An artificial excavation that derives water from the interstices of the rocks or soils which it penetrates.

Well capacity - The maximum rate at which a well will yield water under a stipulated set of conditions such as a given drawdown, pump and motor, or engine size.

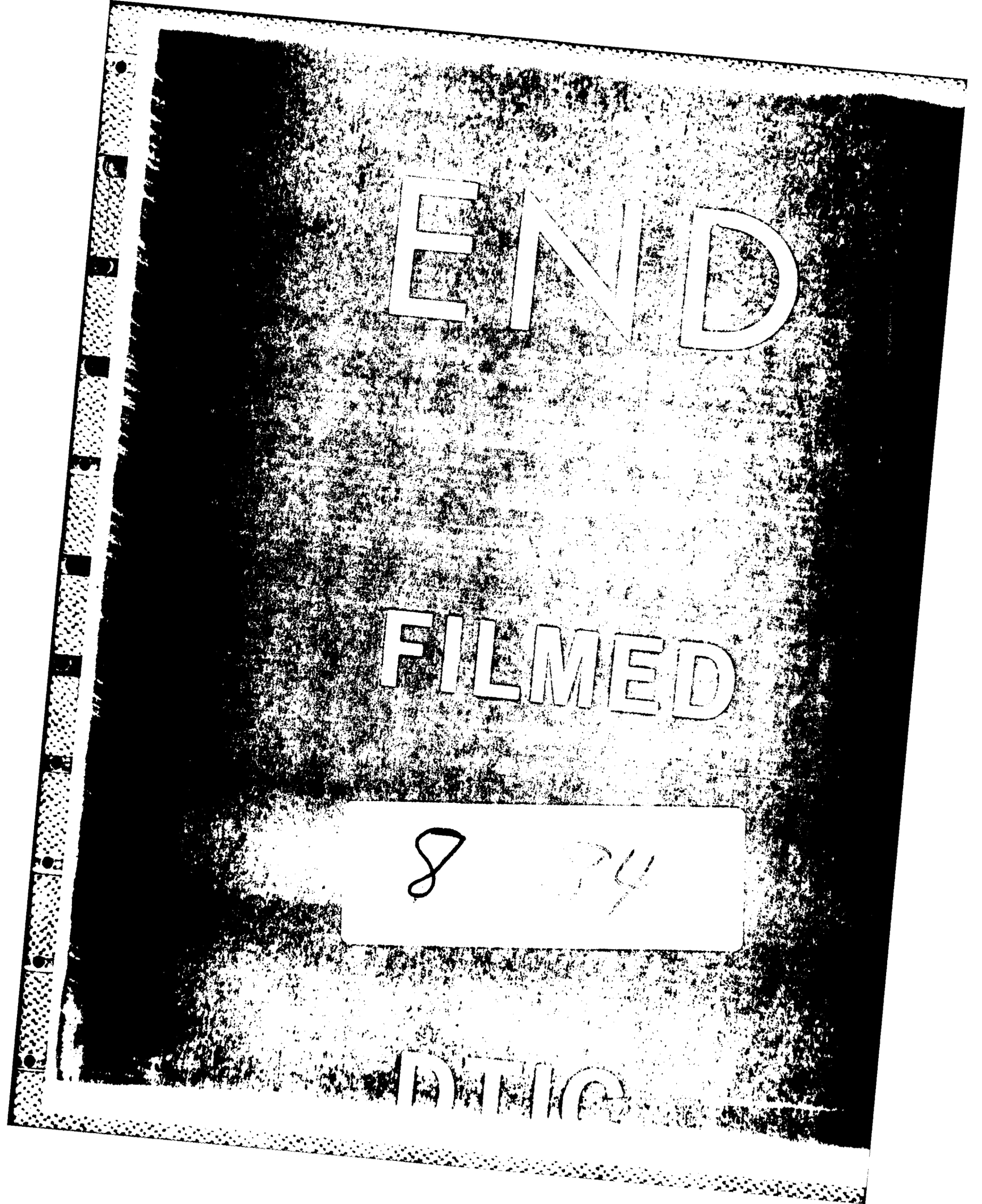
Well field - A tract of land containing a number of wells.

Well log - See drill log.

Work in progress - Construction work undertaken but not yet completed.

Works - A group or assemblage of physical devices and structures for any of a variety of useful purposes; for example, water treatment plant, water pumping station.

Yield - The quantity of water, expressed as a rate of flow, that can be collected for a given use or uses from surface or groundwater sources on a watershed.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